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COMMUNICATIONS

INJURIES TO THE EYES OR TO THE INTRA-CRANIAL VISUAL PATHS IN AIR RAID CASUALTIES ADMITTED TO HOSPITAL*

BY

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Summary

1. 0·75 per cent. of 8,833 persons exposed to risk within 100 ft. of the explosion in 480 high explosive bomb incidents were admitted to hospital with injuries to the eyes or to the intra-cranial visual paths. In terms of all non-fatal casualties treated as in-patients, the proportion with such injuries was 9·6 per cent.

2. 44 per cent. of the "eye" casualties lost the sight of one or both eyes or suffered some impairment of vision (*i.e.*, 0·33 per cent. of persons exposed to risk, or 4·2 per cent. of casualties admitted to hospital with injuries of all types).

3. About 80 per cent of the "eye" casualties were due to flying debris (0·18 per cent. of those exposed to risk and 2·3 per cent. of casualties treated in hospital suffered loss or impairment of vision as a result of such injuries).

4. The proportion of direct injuries to the eye caused by flying debris was higher in Parachute Mine incidents than in those due to smaller bombs.

5. The direct impact of the blast wave did not cause any eye injuries in this series of casualties.

* Received for publication, November 16, 1944.

Apart from discussions on the incidence of eye injuries in confidential papers on air-raid casualties issued by a Unit working in Oxford for the Research & Experiments Department, Ministry of Home Security, one specific report on the subject[1] has already been published. The present note helps to bring the experience of the Casualty Survey up to date.

In general, as has already been noted in previous accounts, direct injury to the eyes can be caused by any one, or by any combination, of the following agencies: bomb splinters, the flame of the explosion (or subsequent fires), secondary missiles (including grit, sand, dust and glass) and direct trauma due to falls. In addition, bomb splinters, secondary missiles or trauma due to falls can cause fractures of the skull with consequent injury to the eye itself or to the intra-cranial visual paths. There is little evidence as yet to show that the direct impact of the blast wave can injure the eyes, and in fact no such injuries were found in the series of casualties discussed in the present paper. These can be roughly classified into three groups, those with :—

1. Direct injuries to the eye from flying debris or possibly from bomb splinters.

2. Injuries to the eye or to the intra-cranial visual paths complicating fractures of the vault of the skull and orbital bones.

3. Miscellaneous injuries affecting the eye or vision which do not fall into groups 1 or 2.

Lacerations of the eye-lids and the surrounding skin have been omitted.

The present series of casualties relates to people who were wounded in twelve air-raids on six towns. In these raids a total of 480 H.E. bombs[2] and Parachute Mines were dropped. 8,833 people were either killed or injured or were discovered by field survey to have been unhurt although within 100 ft. of explosions. 764 were admitted to hospital, where 80 of them subsequently died of their wounds. So far as is known, none of the latter had incurred any eye injury.

Of the 684 non-fatal casualties, 66 (9·6 per cent.) suffered either direct ocular injury or some intra-cranial injury which affected vision. In terms of those exposed to risk within 100 ft. of explosions, the proportion incurring such injuries was 0·75 per cent. 29 of the 66 (44 per cent.) suffered either complete or partial blindness or some permanent defect of vision. In 34 there was no such defect[3]. Thus, 4·2 per cent. of casualties, or 0·33 per cent.

1. Ocular injuries resulting from the War (S. ZUCKERMAN, *Trans. Ophthal. Soc. U.K.*, Vol. LXI, p. 45, 1941).

2. H.E. bombs do not include small anti-personnel bombs or incendiary bombs.

3. In three cases there is no information about the subsequent history of the casualties.

of those who may be considered to have been exposed to risk, were left with some degree of visual defect.

1.—Injuries to the eyeball caused by flying debris or bomb splinters

In 52 (79 per cent.) of the 66 casualties with ocular or intra-cranial injuries which affected vision, the eye itself had been injured by flying debris. Details of the injuries of these casualties are as follows :—

Penetrating wounds	Abrasions of Cornea	Conjunctivitis, dust in eyes, etc.	Details unknown	Total
14	11	25	2	52

These 52 casualties represent 7·6 per cent. of hospital admissions or 0·6 per cent. of those exposed to risk within 100 ft. of explosions.

Penetrating wounds (14 *cases*).—Glass was found in the eye wounds of eight of the fourteen casualties who incurred penetrating wounds. Five of the remaining six were injured by bits of flying debris of a type unspecified, and the sixth may possibly have been injured by a bomb splinter—although a piece of debris may equally well have caused the injury.

The wounds were bilateral in three of these fourteen patients, of whom one lost the sight of both eyes and the other two were left with only misty vision in one eye. Eight of the eleven with unilateral penetrating eye injuries lost the sight of the injured eye. Of the remaining three, two suffered lesser degrees of impairment of vision ; the subsequent history of the third is unknown.

Non-penetrating eye injuries (38 *cases*).—Three of the eleven casualties with abrasions of the cornea were left with some impairment of vision. The 25 patients who incurred conjunctivitis, etc. without corneal abrasions recovered rapidly and completely from their eye injuries although some stayed in hospital for the treatment of other wounds.

Injuries to the eye-ball due to flying debris are known to have caused loss or impairment of vision in 2·3 per cent. of casualties treated at hospital or 0·18 per cent of those exposed to risk.

Injuries to the eyes from bits of flying debris were found to be more common in casualties admitted to hospital from Parachute Mine incidents than in those injured by other types of H. E. bomb. In the former group, 11·7 per cent. of hospital admissions were suffering from eye injuries of this type, while in the latter the figure was 6·8 per cent. In the raids on which these figures are based there was no opportunity of studying the effects of really

large bombs, but mention may be made of the incidence of eye injuries found in 116 casualties admitted to hospital from such an incident in 1941. The proportion incurring direct injuries to the eye from flying debris was 13·8 per cent.

The relation of the incidence of eye injuries caused by debris to other injuries due to the same cause is of interest. The ocular casualties discussed in this paper form part of a random sample of 684 non-fatal air-raid casualties who were admitted to hospital with a variety of injuries. In 475 (69 per cent.) of the total sample there were wounds which had been caused by flying or falling debris.

These 475 can be classified as follows :—

	No.	Per cent.
Other than eye injuries	423	89
Eye injuries and serious wounds of other parts	10	2
Eye injuries and slight wounds of other parts	28	6
Eye injuries only	14	3
Total	475	100

The high proportion of ocular to other injuries, bearing in mind the very small contribution the eyes make to the total mean projected area of the body, can be explained by the greater vulnerability of the eye to small particles of debris ; in circumstances when the latter will produce in the eye an injury which will need hospital treatment, it would produce a cut or abrasion of the surrounding skin which could be treated at an F.A.P. or at home. But in spite of this the proportion of those exposed to risk who incurred ocular injuries was, as mentioned above, only 0·6 per cent.

Serious eye injuries form a larger proportion of severe injuries of all types as the distance from the explosion increases :—

Distance ft.	Total Number seriously injured	per cent. with serious eye injuries
0— 50	137	2
50—100	86	9
100—150	41	10
150—200	14	14

Here again it would appear that the explanation lies in the greater vulnerability of the eye as compared with other parts of the body to the small bits of debris and glass which are the main

injuring agents at further distances. However, the actual number of serious eye injuries occurring more than 100 ft. from bombs in the series of raids under discussion was very small.

2.—Fractures of the vault of the skull and of the orbital bones resulting in injuries to the eye or to the intra-cranial visual paths

Ten (15 per cent.) of the 66 casualties referred to in this paper suffered from ocular injuries or injuries to the intra-cranial visual paths as a result of fractures of the vault of the skull or the orbital bones. In the sample of casualties under consideration these ten represent 38·5 per cent. of the total number who survived such fractures. In six of them fractures of the vault of the skull were complicated by damage to the intra-cranial visual paths, and in three, fragments of bone from peri-orbital fractures had penetrated the eye-ball. One of these last three casualties recovered with his vision unimpaired. In the tenth patient, extensive retinal haemorrhage was found; she was over 100 ft. from a bomb when she received a blow on the head from flying debris which caused simple fractures of the frontal, temporal and zygomatic bones.

3.—Miscellaneous injuries

Four (6 per cent.) of the 66 cases could not be included in Groups 1 and 2. Two of these patients suffered from diplopia following lacerations of the face and scalp, and in a third a previous error of refraction was found to be aggravated by multiple head lacerations. The three casualties received compensation for these defects. The fourth patient was found to have some constriction of the visual fields; she received compensation for this for a time, as it was thought to be due to her air-raid injuries (abrasions of the head with concussion) although she was known to have neuro-syphilis.

The work reported in this paper forms part of an enquiry into air-raid casualties carried out under the direction of Dr. S. Zuckerman for the Research & Experiments Department, Ministry of Home Security. The author wishes to express her indebtedness to Professor W. E. le Gros Clark for facilitating the investigation.

A CENTRAL OPHTHALMOLOGICAL INSTITUTE FOR THE UNITED NATIONS*

BY

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I STARTED many years ago an enquiry in University circles into how my colleagues came to take up their academic career, especially whether there had been an old desire to become a professor or a leaning towards teaching and research. With few exceptions, and these were the sons of professors, I got the answer that *chance* had ruled their fate; a junior vacancy, a scholarship or a fortuitous personal contact with the head of a department had induced these later more or less successful men to take up an academic career.

There is no doubt that chance may give birth to excellent products, but if we want to create the optimum, we cannot rely on chance—until by mutation the right gene develops. If we want to produce good doctors who are urgently needed, we must create first class teachers of medicine. As the profession itself realises that these conditions are so far unsatisfactory we must plan to improve them. There is no doubt that a genius can learn our handicraft unsupported, and discover himself many well known facts with a terrible waste of time and labour. It is in the interest of the nations that the learner should learn the best in the shortest time, so that he can use his knowledge as long as possible to the benefit of the people. To reach this aim we must improve selection and training of the *teacher*.

A plan is here proposed to create a centre of medical education, according to the writer's restricted experience in ophthalmology only, from which perfectly trained clinicians will rise with the highest standard of scientific experience, to become all-round clinical chiefs trained to take over the teaching of the medical schools.

As such an institute will be expensive very great units only are suitable for this purpose, although private initiative and private charity may facilitate its organisation. I have in mind a common central institute of ophthalmology for the United Nations. Parallel institutes for other subjects ought to follow. They may be distributed over the big towns of the nations according to where they are needed and where there are suitable teachers available. In the near future the *common* budget of the allied nations will be considerable. The idea of a *common education* must not be forgotten. The central medical institutes are part of it and all nations will enjoy the fruits of their work.

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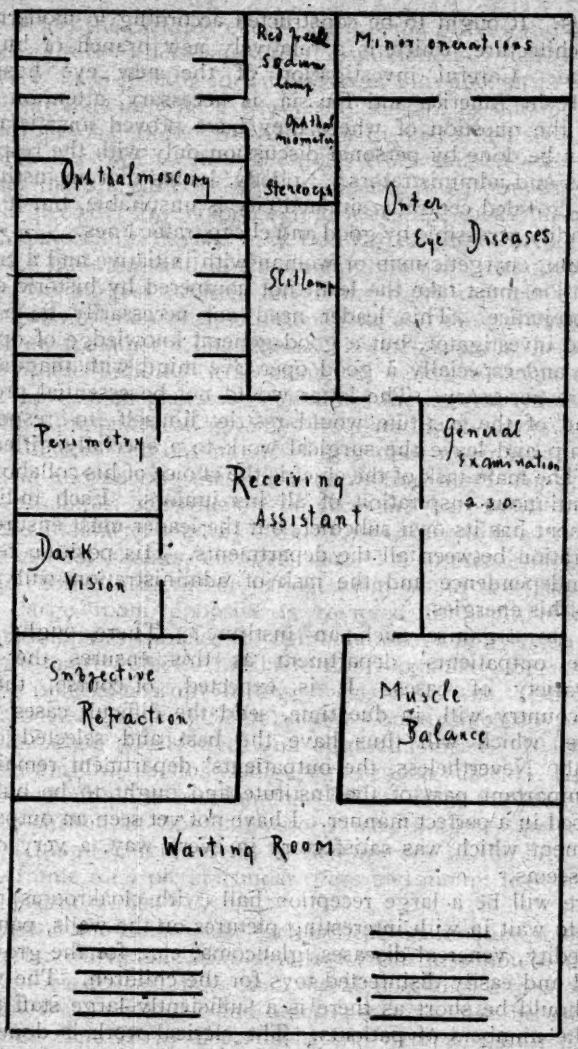
† From the Tennent Institute for Ophthalmology (Professor W. J. B. Riddell) Glasgow.



A blueprint only of such an institute is offered here, but it is far from perfect. It pretends to contain no more than some ideas collected by observation and work in different clinics, experiences gained in teaching and investigation in different countries; and last but not least, it is written with knowledge of certain deficiencies of our present system.

The new institute can scarcely be housed in one of the older

buildings. It ought to be constructed according to modern hospital architecture, which is a relatively new branch of building technique. Careful investigation of the new eye hospitals, especially in America and Russia, is necessary, attention being paid to the question of where they have proved *un*satisfactory. That can be done by personal discussion only with the respective surgeons and administrators. Nobody doubts that an institute in an over-crowded centrally situated city is unsuitable, but it ought to be readily accessible by good and cheap traffic lines.

A young energetic man or woman with initiative and a creative imagination must take the lead, not hampered by historic or any other prejudice. This leader need not necessarily be a great scientific investigator, but a good general knowledge of ophthalmology and especially a good operative mind with manual dexterity are necessary. The latter would not be essential provided the head of the institute would restrict himself to responsible leadership and leave the surgical work to a specially gifted subchief. The main task of the chief is the choice of his collaborators, and continuous inspiration of all his juniors. Each individual department has its own subchief, but the leader must ensure close collaboration between all the departments. His position requires great independence and the task of administration will absorb much of his energies.

How to organise such an institute? There ought to be a large outpatients' department as this ensures the necessary variety of cases. It is expected, of course, that the whole country will, in due time, send the difficult cases to this institute, which will thus have the best and selected clinical material. Nevertheless, the outpatients' department remains the most important part of the institute and ought to be built and organised in a perfect manner. I have not yet seen an outpatients' department which was satisfactory in every way, a very difficult task it seems.

There will be a large reception hall (with cloakrooms) for the public to wait in with interesting pictures on the walls, pamphlets on heredity, venereal diseases, glaucoma, etc., for the grown ups to read and easily disinfected toys for the children. The waiting time should be short as there is a sufficiently large staff to cope with the numbers of patients. The clerical work is done there, the case history typed, general anamnesis done and visual acuity noted. The patient passes straight on to a central room, where the receiving assistant is the first specialist to see the patient. He completes the anamnesis according to his diagnosis—typed again—and directs the patient to one or more of the cubicles with cards (1, 2, 3 . . . according to what is needed). When all the examinations are finished the patient returns to the receiving assistant who

either orders the therapy, checks the ordered glasses and dismisses the patient, or orders any other examinations which might be necessary, or keeps him for admission or introduction to the chief. It is clear that only an experienced assistant is suitable for this responsible job. Before the patient is dismissed the social worker enters in her own. She takes notes from suitable cases, where heredity plays a part, where the influence of surroundings is not to be neglected. Psychological injuries escape easily the attention of the busy clinician, she may be of great value in the case of neglected children, and of glaucoma clinics (M. Schoenberg).

The two biggest cubicles are to the right and left where the external diseases are treated on one side and the ophthalmoscopy is done on the other. The external diseases room is the brightest in the whole building with plenty of windows—some of them should have small panes for examining the corneal reflex. Some perfectly equipped treating tables are placed in the room, one each for two doctors and one nurse. There must never be a crowd in this room and nobody must be kept waiting here. An operating chair of simple construction is necessary for small incisions, hordeola, tonometer readings, etc. One corner with a microscope is reserved for smears, cultures, etc. The presence of a photographic cabinet near the outpatient room would save time.

The large room opposite is reserved for ophthalmoscopic examination, with cubicles for ophthalmoscopy and skiascopy. If there are many cubicles available this room may be used for teaching ophthalmoscopy in bigger classes as well. On the free walls are Red-free and Sodium-lamp—ophthalmoscopy, stereo-ophthalmoscope (Gullstrand) and ophthalmometer. Blackboards for explaining the fundus changes are in each cubicle. The walls are covered with the best fundus pictures from the literature so that the student of ophthalmoscopy may become familiar with them. I found it very useful to sacrifice one of the best fundus atlases, frame each picture under glass and mount them round a movable vertical axis.

The next room is the place for physical examination, blood and urine tests, where the ophthalmologist can also obtain the collaboration of an ear, nose and throat specialist and a dentist. Cases for the neurologist and other specialists may be examined elsewhere. The X-ray department and treatment with different rays is not necessarily in close connection with the outpatients' department.

A slit-lamp room is equipped with all modern instruments and also there is a perimeter room and a room for dark adaptation and night vision tests, all to be entered from the central space. The special room for subjective refraction should be large with several sets of test types, etc. Examination of muscle balance may be

combined with the orthoptic department. Each of these rooms is in charge of one assistant. The rotation of the assistants and their periods of duty in the departments may be fixed, but the rule ought to be elastic, and individual wishes should be considered as far as possible. It is easily understood that an assistant who dedicates all his time and his brain to his special work will learn more than to do routine work and will soon contribute to actual progress and research.

The most important hour of the day is the staff meeting, when the interesting cases from the outpatients' department are considered. Discussion of the cases is initiated by the reporting assistant, then follow questions by the inexperienced, reports from the seniors, explanation, if possible with demonstration of histological slides of the clinical collection, mention of cases in the literature; all these factors make such an hour far superior to the best postgraduate lecture. It is most important that the whole staff should take part at these meetings, the presence of the members of the laboratory staff being especially valuable.

The rooms for inpatients must not be large; they must be strictly aseptic with huge windows, best made of a material permeable to ultra-violet rays. Several small modern theatres are preferable to one large one. They should be close to one another to enable the visitors to see *more* operations in a given time. It is necessary that this institute should perform rare operations too, and accept sensible innovations of technique as the first. The whole ophthalmic world will listen to and take note of its constructive criticism. As it is a teaching hospital asepsis cannot be overdone.

The rounds of the chief with the whole staff, twice a week, complete the daily staff meetings of the outpatients' department. Again questions and answers are the vehicle of progress. These rounds are necessarily performed at a very early hour as the staff will be busy during the outpatients' periods. For the same reason operations should be performed early in the day too.

The laboratory is the centre of the *afternoon* activity of the staff, as the histological laboratory is the source of deeper understanding of physiology and pathology of the eye. Histology does not belong to the past, but is, according to my conviction, at its beginning as yet. New methods of investigation ought to be introduced, and the results will be amazing. Bacteriology of the eye, especially the study of the virus diseases, is in its infancy. The electron microscope will be the instrument of many future investigators of eye diseases. Tissue culture, chemical, physicochemical, optical and physiological activity require special training and are not strictly included in the curriculum of the institute. They are available only to special investigators. But the whole staff will learn at least something of this work from the reports of

the specialists in the *evening* staff meetings which are reserved for scientific reports in the narrower sense.

The department of photography, including cinematography, colour photography, fundus photography and photomicrography is an essential part of the institute I am describing. An artist of special gifts is in charge of the clinical, especially the fundus pictures, and he ought to supervise the work of his apprentices. There will be a great need of scientific artists, and a higher estimation of their work than exists nowadays when they remain frequently anonymous. Many young artists will take up such a career.

Promising young men will find in such an institute all that teaching can offer in a concentrated form. They have to pass through *all* the departments, including the laboratories. These men become real all-round clinicians, a very rare thing to-day even with excellent clinical teachers. Most of them restrict their work to one or some sections only of our subject. It is easily understood that postgraduate teaching will find a very suitable home in this institute generally.

Scientific production has ideal conditions in this central institute. The library must contain the specialistic as well as part of the general medical literature of all nations. Linguistic difficulties in reading papers in a foreign language are removed by a special auxiliary staff who are available also to other institutions. The position of such an institution in the scientific world will be dominant, its production of high value and correspondingly regarded.

We ophthalmologists suffer from the lack of a journal with careful reports of the contemporary literature compiled quickly after the publication of the original article. Such an institute would be the right place for professional men to do the job. Experienced scientists only are able to give a short and exhaustive summary of a paper with a certain degree of criticism allowed.

Who may enter this Mecca of ophthalmology? All the promising young men and women of the eye clinics of the United Nations have a right to apply. Those with the best qualifications, in a wide sense of the word, are admitted, first for a restricted period. They become members of the staff later according to the judgment of their seniors. The best of the juniors are elected to senior posts and out of the seniors the teachers of ophthalmology will arise all over the civilized world.

The ophthalmic centre keeps its staff active from chief to the youngest assistant from morning till night. All have a full time job, therefore a private practice in the common sense is absolutely excluded. The salary of all employees is modest but sufficient to live an independent life. Securities for old age in the form of a

pension for retired workers are needed. It is not necessary to emphasise the great honour of being a member of this institute. The nomination of outstanding foreign ophthalmologists as corresponding members of the institute would stress its international character.

There is no time or space here to deal with linguistic difficulties, but we stress the fact that all the governments of the United Nations accepted English as *the* second language. The knowledge of English or of Basic English will spread to a hitherto unknown extent. Or an artificial language will link the nations. But these difficulties are practically inconsiderable. I remember the American assistants of Elschnig's clinic in Prague 20 to 30 years ago. Most of them spoke English only, but they had no difficulty with our Czech patients. These so-called difficulties will be negligible in the near future when isolationism will be obsolete. And finally, the population of the city in which this central institute is erected will feel rightly proud and fortunate.

I do not doubt that the old system—being no system at all—with its laissez faire, leaving all to chance without offering a fair chance to all, produced many great men.

We shall improve the selection of the able and we shall improve the conditions of training. In this way we can expect very good results.

The fact that the path we tread is a new one is no reason to refute the idea, especially in these times when progress goes forward at an increasing pace. *

* On reading the proofs I want to add that Joseph Needham explained his idea of international scientific collaboration recently (*Nature*, Nov. 25, 1944), in a very interesting article from which concrete proposals emerge.

THE EYE OF THE WEST AFRICAN NEGRO*

BY

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GLASGOW

THERE are certain differences between West African and European eyes which are noteworthy.

1,000 Gambian schoolchildren, 1,100 Gambian, 300 Gold Coast, 800 Nigerian and 300 Cameroon soldiers were examined in addition to hospital and out-patients seen at a West African Military Hospital over a period of 18 months.

The most obvious difference was pigmentation [mentioned by Duke-Elder (1932)]. Ninety per cent. of African soldiers presented

* Received for publication June 9, 1944

scattered dots of pigment in the interpalpebral conjunctiva, frequently associated with signs of hyaline degeneration. This was less in children, and was taken to be a normal development and not harmful. The pigment was found in the basal cells of the epithelium. No evidence was found to suggest that avitaminosis was a factor.

(One case of subconjunctival ecchymosis was found to have the whole bulbar conjunctiva raised with blood except two triangular areas based on the limbus and extending out 5 mm. towards the canthi. This suggested that the pigmented conjunctiva was bound down to the underlying tissues. The other eye showed no more than the usual pigmentation and yellow degeneration in the corresponding areas).

On raising the upper lid, normal conjunctiva was seen, frequently studded with pigment around the perforating arteries.

Three per cent. of cases showed the marbled sclera of melanosis bulbi.

Early pterygium was found in 7 per cent. of soldiers but invasion of the pupillary area of the cornea was not seen.

A complete ring of pigment was found in all natives at the corneo-scleral junction. Children and lighter coloured natives had this ring also, but in a lesser degree. The ring was 1 mm. to 1·5 mm. broad, and tended to be wider above and below. The pigment was more concentrated at its outer rim and tapered off on to the clear cornea as fine dots or sometimes as finger-like processes. The latter suggests pigment slides, resulting from a healed epithelial scar, described by Mann (1944). Pergens (1898) noted this ring of pigment in Congo negroes, but it is still sometimes wrongly taken to be a result of inflammation.

Old channels could be seen as grey lines crossing the ring, often obliquely. There was a marked contrast in vascularity of the limbus between natives and Europeans. No healthy native eye had vessels visible beyond the pigment ring or in the pigment ring, but 35 per cent. Europeans had vascularity of or beyond the limbus. (Scott 1944.*a*.) This is an argument against the opinion that "the average degree of corneal vascularity in a group of subjects is a reliable index of their general state of nutrition." (Lyle *et al.* 1944)

In all the natives examined it was found that limbal vascularity was pathological, and that by far the most common cause was trachoma. Vascularising keratitis should not be diagnosed as being caused by tropical diseases until trachoma has been excluded.

The iris was pigmented brown except in the half-caste. Strands of persistent pupillary membrane were more common and more gross than among Europeans.

Five per cent. of cases had parts of the iris stroma filled with white exudate. This can only be seen by magnification. This might suggest congenital syphilis in a European (Dennie, 1941) but none of these cases had stigmata of congenital syphilis and a Kahn precipitation test in a small number showed no higher incidence of positives than normal. It is worth noting here that enlargement of the epitrochlear gland is found in 40 per cent. of natives on routine examination.

Five cases of flocculi iridis were seen in the 3,000 cases.

The lens, vitreous and fundus were not examined in all cases but presented no special points, except perhaps the rarity of congenital lens changes.

No essential difference was noted between the normal African and European fundus despite the denser choroidal pigment of the former. The chocolate or slate grey negroid fundus of some text-books was never seen. Tigroid fundus was found in 2 per cent. cases. Opaque nerve fibres were seen once only.

In 5 per cent. of cases, the retinal vessels were cuffed as they left the disc. The significance of this will be discussed later.

Visual acuity.—Visual acuity of natives compared favourably with that of Europeans. In 1,500 soldiers (taken equally from Gambian, Gold Coast, Nigerian and Cameroon regiments and all enlisted without any test of visual acuity) 94 per cent. had vision of 6/6 R. and L. and 86 per cent. could see 6/4 R. and L. (tested with Landolt's rings).

1·5 per cent. required glasses and the majority of the remainder had corneal opacities from trachoma.

Less than 1 per cent. were unfit for military service on visual findings. Myopia was rare and strabismus exceptional.

Vision among the Cameroon soldiers was surprisingly good, considering the high incidence (nearly 100 per cent.) of onchocerciasis, sometimes called the blinding filaria.

Drugs. The action of drugs merits comment. It was soon found that 2 per cent. homatropine and cocaine had little or no effect on the African pupil. Fresh solution gave similar negative results, although Europeans responded in the normal way to the same drops.

Using one drop in one eye only, the effect of drugs was tested in Africans in batches of 40 or 50, using Europeans as controls. It was found that (*a*) 2 per cent. cocaine hydrochloride, alone or with 1:1,000 adrenalin, and (*b*) 2 per cent. homatropine hydrobromide, while dilating the European pupil, failed to dilate the African pupil when used separately or together.

Using 2 per cent. cocaine with 5 per cent. homatropine, a modest mydriasis resulted in most cases.

Atropine 1 per cent. produced full mydriasis in 20—30 minutes, lasting 5 or 10 days, and eserine produced a normal contraction.

Unilateral nerve block of the cervical sympathetic was induced in two Africans whose pupils had failed to respond to cocaine and adrenalin. A typical Horner's syndrome resulted, indicating that the failure of drugs was not due to faulty innervation.

Diseases.—A review of cases admitted to hospital indicated the common eye diseases among soldiers.

A similar review of out-patients seen at Lagos by Dodds (1942) was found very helpful, though differing in some conclusions.

Work has been done in the past on individual diseases, such as trypanosomiasis (Daniels 1918) and onchocerciasis (Hissette 1932), but there is little knowledge of the common eye changes found in West Africa or of what constitutes a departure from normal.

In the earlier paragraphs an attempt has been made to indicate what constitutes a normal African eye. The common ocular diseases and their causes will now be described.

In seeking a cause for eye changes one is confronted with the facts that yaws, filariasis, intestinal worms, avitaminosis, gonorrhoea, and malaria are very common, while syphilis, leprosy tuberculosis, trypanosomiasis, and small pox are not unknown, and that many natives have two or more of such diseases.

It is planned to publish more detailed reports later to support the views expressed on trachoma and on onchocerciasis.

The natives presented some eye changes not seen among Europeans, but conversely no case of chronic marginal blepharitis and only one of phlyctenular conjunctivitis was seen. Ophthalmia neonatorum is almost unknown despite the prevalence of gonorrhoea. Wilson (1935) has noted the same immunity in Egyptian babies. A list of 218 hospital cases treated in 16 months is given in the following table.

	Cases		Average number of days in hospital
Conjunctivitis	32	90	12
Trachoma	58		20
Keratitis	12	40	25
Keratitis punctata onchocercosa	28		25
Corneal ulcer	21		18
Irido-cyclitis	21		32
Choroido-retinitis ...	16		30
F.B. and injuries ...	10		7
Styes and cysts ...	9		7
Other disease	11		

Conjunctivitis.—A few cases of follicular conjunctivitis and of spring catarrh were treated. The absence of pannus differentiated such cases from trachoma.

Four cases of gonorrhoeal conjunctivitis were seen. The number of cases of gonorrhoea treated in the same period in the central division was 660. Cases were treated with four intra-muscular injections of 1 gm. sulphapyridine suspended in 10 c.c. saline. This treatment cleared up the gonorrhoeal conjunctivitis in effective fashion, but the injections are painful.

In general, conjunctivitis was not common and responded well to irrigations and protargol 10 per cent. drops.

Trachoma.—This was a mild disease of infiltrative rather than of follicular type. It was found in 5 per cent. of schoolchildren, in 10 per cent, of Gambian soldiers, and in 25 per cent. in some villages. Gold Coast and Nigerian soldiers showed 10 per cent. but only 2 per cent of Cameroon soldiers were affected.

Among 300 American negroes, no cases were seen, but 2 negroes from the same battalion had developed trachoma after 3 months in Liberia.

Many of these cases were subclinical and gave no history of past or present eye trouble despite the presence of tarsal changes and of pannus. In some cases, pannus was the sole sign of trachoma and, as has been stated, the most common cause of vascularity of the cornea was trachoma.

The hospital cases complained of photophobia and epiphora but often had no secondary infection. The upper rim of cornea was usually macerated superficially, but the eyes settled with 1 per cent. atropine and 10 per cent protargol drops. Sulphonamides did not hasten the improvement. Trichiasis was such a rare complication that active treatment with copper sulphate was held in reserve.

Keratitis.—Keratitis was a rare complication in 150 cases of trypanosomiasis although corneal changes due to trachoma were common in this series.

Over 1,500 malarial cases were treated in hospital but no ocular symptoms were reported.

Apart from corneal ulcers and scars, deeper maculae and grey nebulae were common and were seen in the cornea of 2 per cent. children and of 5 per cent., 18 per cent. and 25 per cent. of Gambian, Nigerian and Cameroon soldiers.

No evidence was found to suggest that avitaminosis was a factor.

A high proportion of cases were associated with trachoma or with onchocerca volvulus.

Keratitis due to leprosy or to small pox must be borne in mind, but no cases were observed in this series.

Keratitis punctata onchocercosa.—Onchocerciasis was found in 5 per cent. Gambians, in 50 per cent Nigerians and in 100 per cent.

Cameroons (approximate figures). Half of the cases had no palpable nodules and were diagnosed by skin snip.

Small discrete yellow speckled nebulae in the substance of the cornea were suggestive of onchocerciasis and, if a fine deposit of pigment was seen on the posterior corneal surface, the diagnosis was almost certain.

The yellow nebulae either fade or develop into the grey nebulae referred to in the previous paragraph [described by Robles (1916) and Luna (1918) in America and by Hissette (1932) in the Belgian Congo.]

These changes are probably due to toxins from the adult worm, as microfilariae were seen not uncommonly in anterior chambers of eyes with clear corneae. No microfilariae other than O. Volvulus were found in the aqueous.

Many cases of an onchocerciasis were found without palpable nodules which suggests that the rôle of the non encapsulated worm is important in producing eye changes, and that the removal of nodules is of doubtful value.

Iridocyclitis.—This subject overlaps keratitis punctata onchocercosa, as many of these cases have a mild iritis also, characterised by the deposit of fine pigment on the posterior corneal surface, previously described by Hissette (1932). Other cases of iritis were associated with strongly positive Kahn tests and were taken to be syphilitic. Two such cases presented avascular syphylomata of the iris, which responded well to potassium iodide.

Iritis is an uncommon but important complication of trypanosomiasis (Scott 1944*b*). Signs of iritis were found in 7 of 150 cases of trypanosomiasis but in 4 of 26 cases treated in hospital, irido-cyclitis was the presenting sign of the disease. Acute iritis with hyphaema was seen in one case of gonorrhoea.

Choroido-retinitis.—Patches of choroiditis were rare even in onchocerciasis, [*cf*. Bryant (1935) and Hissette (1937) who found them common].

Cases of retinitis with strongly positive Kahn test, tended to have exudate lining the vessels and a low grade oedema of the retina without patches of choroiditis.

It was not found possible to differentiate cuffing of the vessels in syphilitic cases from that in healthy eyes. Cuffing was found more often in cases with a positive Kahn test, but further work is required before any significance can be attached to this finding.

Cases of optic neuritis are included in this section. Retrobulbar neuritis associated with onchocerciasis, as described by Hissette (1937), was noted. The syndrome of oedema of the lid, ciliary flush, proptosis, and oedema of the optic nerve has been described elsewhere (Scott, 1944*c*.) This is believed to be an allergic response to Onchocerca volvulus. No optic atrophy

attributable to avitaminosis as described by Fitzgerald Moore (1928-37) was seen, though deficiency of B_2 was noted in 36 per cent. of Gambian soldiers.

F.B. and injuries.—When cutting firewood, many natives sit with the wood in front of them. Using a native axe, they chop towards themselves. Thus a wound of the lower half of the cornea is not uncommon.

A few cases were seen in which an insect wing or a husk of grain was attached to the palpebral conjunctiva by suction, giving rise to no pain or inflammation.

Small blue or black grains were found in some lower fornices. These were particles of "tiro stone" which the natives grind into a fine powder and apply to the lashes "to beautify and to cleanse the eye." It is said to be an antimony salt.

Other diseases.—The following case may be of interest.

A case of detached retina was incorrectly diagnosed as vitreous haemorrhage, as the red reflex was abolished. Transillumination having failed (due to pigment), a needle was introduced into the vitreous to establish the diagnosis but straw coloured fluid was withdrawn.

As the retina fell back, a detachment and hole became visible, which was successfully treated by operation. Indirect and direct examination with + lenses had failed to show any sign of detachment previously in any quadrant of the fundus.

Summary

1. Pigment of the interpalpebral conjunctiva and a ring of pigment round the limbus are normal.

2. Vascularity of the cornea beyond the ring of pigment is pathological and is most frequently caused by trachoma which should be excluded before pannus is attributed to tropical diseases.

3. The negro fundus is red, not chocolate or slate grey, in appearance.

4. 2 per cent. homatropine and cocaine is not an efficient mydriatic.

5. Nebulae in the substantia propria are common and are most frequently caused by onchocerciasis and trachoma.

6. Iritis is caused by onchocerciasis and by trypanosomiasis as well as more usual diseases.

7. Microfilariae are not uncommon in the aqueous, where they are well tolerated. The most common, if not the only one, is M.f. Onchocerca volvulus.

8. The value of removal or destruction of nodules containing the adult Onchocerca volvulus is doubted as the non-encapsulated

worm plays an important part in infection and in producing ocular complications.

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EYE DISEASES IN THE EAST*

BY

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I WORKED in Iraq as Ophthalmologist to the Baghdad Military area in 1941 and 1942 when I also had the opportunity to study the eye diseases of the native population. I shall briefly describe these before giving an account of the eye diseases amongst the British and Indian troops then stationed in Iraq.

Epidemics of infective ophthalmias occur regularly every year in Iraq, Palestine and Egypt. They begin in May and last until December. The out-patient departments of the hospitals are then crowded with patients amongst whom infants and children predominate. A small eye hospital in Baghdad had an average daily attendance of over 200 patients. There was only one ophthalmic surgeon to look after them. Male and female nurses assisted him. Infective ophthalmias largely attack children under twelve. They develop a severe mucopurulent conjunctivitis which is usually associated with ulceration of the cornea. This conjunctivitis is caused by a variety of organisms (Koch-Weeks,

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staphylococcus, Morax-Axenfeld, gonococcus and bacillus diphtheriae). From May until August Koch-Weeks and staphylococcal are the most common infections. The more severe epidemics of gonococcal and diphtheritic type begin at the end of September and last until December. Epidemic gonococcal mucopurulent conjunctivitis spreads directly from one patient's eyes to those of another without any associated urogenital infection. This type of infection involves the cornea which sloughs very rapidly. The bulk of the patients were treated with argyrol or protargol drops, silvering of the lids and intra-muscular injections of milk (fever therapy). The results were often most distressing. Every day I encountered in the out-patients' department perforated corneal ulcers with iris prolapse. Only a very small proportion of the patients were treated with M.B. 693 tablets administered internally. The shortage of supplies and the high cost of this drug prevented its widespread use in 1941 and 1942. The results of treatment with M.B. 693 were very good. The sloughing of the cornea was stopped and the cases improved rapidly. One can therefore easily understand why there is such a high incidence of total or partial blindness in Iraq. Investigations by Wilson and others in Egypt on the carriers of infection and on the possible causes of infection are interesting. The highest incidence of cases is recorded in the hottest months of the year when the relative humidity of the air is at its lowest. During those months the flies multiply rapidly. They, with dust and sand, are probably the principal carriers of infection. It has also been suggested that following the winter months children have a lowered local and general resistance to infection due to a lowered concentration of vitamins A and C in the body. However, it must be pointed out that the largest epidemics of infective ophthalmias occur in Egypt, Palestine and Iraq where there is very little evidence of vitamin A deficiency, whilst in India and Ceylon, where vitamin A deficiency is common, epidemic ophthalmias do not affect such high proportions of the population nor do they attain the virulence that is encountered in the Middle East. One has therefore to seek further for causes which lower the local resistance of the conjunctiva to these infections.

Iraq, like Egypt, is full of trachoma. Although there are no reliable statistics 60 per cent. of the population is thought to be trachoma infected. This is again a child's disease and it is at this stage of life that it is most infectious. The bulk of the trachoma cases were treated with the usual silvering of the lids, expression of the follicles and copper stick in the later stages. Treatment of trachoma with sulphonamides has now an established reputation in ophthalmology. In Iraq sulphonamides were rarely used for trachoma in the civilian hospitals in 1941 and 1942.

Again the shortage of supplies and the high cost of the drug prevented its widespread use. I saw it used in selected cases with extremely good results. A good deal of blindness can be prevented by the routine use of sulphonamides in trachoma. My impressions resulting from the study of eye diseases amongst the natives of Iraq are that the country needs a much larger number of trained ophthalmologists to deal with the thousands of cases needing urgent attention. It is to be hoped that in the future the Government of Iraq, with the co-operation of the International Association for the Prevention of Blindness, will organise an efficient ophthalmic service which will prevent the high incidence of blindness in that country.

After this short review of eye diseases in the native population I will go on to the eye diseases amongst the troops stationed in the Baghdad area in 1941 and 1942. The British troops showed a very low incidence of infective eye conditions. There were no epidemics of conjunctivitis amongst them. A number of isolated cases of mucopurulent conjunctivitis occurred. Some were associated with corneal ulceration. There were no cases of trachoma amongst these British troops. The Indian troops had a very much higher incidence of mucopurulent conjunctivitis associated with corneal ulceration of varying degrees of severity. A large number of cases showed signs of old trachoma. It is significant to note the higher incidence of conjunctivitis amongst the Indian troops in comparison with the British. Trachoma, with its lowered resistance to infection, will explain some of these cases but not the large number of Indian soldiers suffering from infection of the conjunctiva and cornea without any signs of trachoma. One is led to wonder why British and Indian soldiers, reaching Iraq in a good state of health, should show such different degrees of resistance to eye infections. The different food may have some relation to the problem. There were no cases of gonococcal or diphtheritic conjunctivitis amongst the British or Indian troops. I will not deal with the other conditions which are to be found amongst the troops in the tropics—glare asthenopia, night blindness, etc. In this paper I have especially confined myself to the infective diseases of the native population and of the troops stationed in the same area.

In the past in many wars in the East epidemics of conjunctivitis and trachoma, known as military ophthalmia have affected the eyes of thousands of soldiers of the British and French armies. In this war our troops, stationed in an area known from time immemorial as a hotbed of infective eye diseases have not suffered from epidemic conjunctivitis or trachoma.

In March 1942 I left Baghdad and proceeded to Karachi. There in the ophthalmic department of the Civil Hospital I saw my

first case of keratomalacia in an infant. Keratomalacia is due to vitamin A deficiency. It occurs in marasmic children. The clinical picture in the eye varies from a mild xerosis of the conjunctiva (lack of lustre, wrinkling of the conjunctiva and Bitôt's spots) to a grave condition in which the cornea is affected. Hypopyon ulcer, corneal necrosis and panophthalmitis are the final grave eye complications which lead to blindness. Night blindness is usually a prominent symptom of the disease. This condition is common amongst the children of the poor Hindus of Karachi and the surrounding country. In India cod liver oil is now unobtainable. Shark liver oil has been shown to contain a high vitamin A and D content and is used with success in the treatment of this condition.

Trachoma is very prevalent in the Karachi district. Epidemics of gonococcal and diphtheritic conjunctivitis are unknown but epidemics of conjunctivitis due to Koch-Weeks and staphylococcal infection occur regularly every summer.

I reached Ceylon in April, 1942, a few days before the Japanese air raid on Colombo. For a short time after the raid the civil hospitals were half empty. The patients were evacuated. After several weeks the Civil General Hospital filled up again. Once more I was able to study the eye diseases amongst the natives.

Trachoma is comparatively rare in Ceylon. An investigation carried out in a Muslim village in the Kandy district in 1939 showed that 2·9 per cent, of the people examined were infected with trachoma. Investigations amongst the Sinhalese showed a very much lower incidence of trachoma infection. Epidemics of conjunctivitis occur with the onset of the Monsoon in April. They are the mild Koch-Weeks infections. Throughout the summer months of May, June, and July there are a large number of cases of infective punctate keratitis which often causes central scarring of the cornea. Keratomalacia due to vitamin A deficiency occurs amongst the very poor. I visited with Dr. Billimoria, a civilian ophthalmologist of Colombo, a large labour corps camp. The labour corps was started after the Japanese air raid on Colombo and its members are recruited from all the communities living on the Island. Amongst the 500 men examined we found only three who showed signs of having had trachoma in childhood. On the other hand we found that about 50 showed old patches of xerosis of the conjunctiva (Bitôt's spots). Evidently at an earlier stage of life they had suffered from vitamin A deficiency which had caused a mild xerosis of the conjunctiva without leading to keratomalacia.

Ceylon has about 3,000 lepers. Several times I visited the leper hospital near Colombo. It has about 700 in-patients. For some years the Ceylon Health Department has conducted a campaign

against leprosy on very efficient lines. Co-operation of the population was essential for the registration of the lepers. This was not forthcoming at first and many families concealed their lepers. Now the population has realised the importance of notifying the disease and it can be assumed that the number of 3,000 lepers given above represents the total on the Island. All infectious cases are isolated in hospitals. Cases which are not considered to be infectious return to their homes. They report to the hospital at regular intervals. At the leper hospital I was able to examine a large number of lepers suffering from eye diseases. Dr. Simon, the present Medical Superintendent of the hospital, very kindly collected cases for me. The chief manifestations of leprosy in the eye are the presence of lepromatous nodules on the conjunctiva. These nodules also spread into the cornea. Most of the cases were complicated with iritis and iridocyclitis. Another group of cases showed no lepromatous nodules on the conjunctiva or cornea but had a superficial and deep keratitis without any lepromatous invasion anywhere near the eye. Blepharitis is an exceedingly common condition amongst the lepers. An ophthalmic surgeon visits the hospital at regular intervals. The lepers live to a very old age. The youngest case seen at the hospital was seven years old. The routine treatment consists of intramuscular injections of chaulmoogra oil. Many cases leave the hospital after a long course of treatment and are considered to be non-infectious.

During my stay in Ceylon, April, 1942, to February, 1943, I looked after British, Indian, Ceylonese and East African troops. In the wards of the British Hospitals I invariably had six or more patients suffering from mucopurulent or catarrhal conjunctivitis often associated with corneal ulceration but there were no epidemics of Koch-Weeks conjunctivitis amongst the British troops. Infective conditions of the skin, impetigo, boils and ringworm were very common amongst the troops. They were often associated with conjunctivitis and blepharitis.

The Indian Hospitals, as in Iraq, had a very much higher number of in-patients suffering from eye diseases. The Indian soldiers suffered from more severe forms of mucopurulent conjunctivitis, in most cases associated with corneal ulceration. A number of these cases showed signs of old trachoma infection. The Indian and Ceylonese troops also suffered from epidemic punctate keratitis which was common amongst the natives in the summer months. It is most significant that no such cases of epidemic punctate keratitis were seen amongst the British troops. The cases seen amongst the Indian troops were often severe, associated with the enlargement of the pre-auricular glands, a good deal of conjunctival oedema and extensive deep punctate deposits in the cornea often leading to serious loss of vision. My only

explanation for the occurrence of epidemic keratitis amongst the Indian troops and its absence from the British would be that the Indian soldier associates much more freely with the native population amongst whom these epidemics occur regularly every summer. These epidemics of punctate keratitis (epidemic kerato-conjunctivitis) occur in the rice eating countries (Malaya, Dutch East Indies, Southern India, Ceylon, etc.). Careful investigations may in the future show that the lowered resistance of the eye to these virus infections may have some relation to the diet of the native population which is in most cases deficient in the vitamin B complex.

A note on the treatment of mucopurulent conjunctivitis may be of interest. In Iraq in 1941 and 1942 I adopted as a routine the internal administration of M.B. 693 tablets for all severe cases of mucopurulent conjunctivitis complicated or uncomplicated with corneal ulceration. Three grm. (6 tablets) were administered daily from 4 to 7 days. This treatment enabled the soldiers to return to duty in a very much shorter time. The Indian soldiers who often suffered from old trachoma complicated with secondary infection (staphylococcus or other organisms) responded to M.B. 693 treatment in a very satisfactory manner. The corneal complications were less frequent and again their stay in hospital was shorter than before the M.B. 693 was adopted. In Ceylon I followed the same course of treatment until July 1942 when I happened to have under my care a British soldier who was suffering from a mucopurulent conjunctivitis of both eyes with extensive marginal corneal ulceration and a "tick bite" ulcer of his leg. "Tick bite ulcers" of the leg were common in Ceylon amongst the British and Indian soldiers. The men were bitten by ticks during exercises in the jungle. Scratching of these bites caused abrasions of the skin which became infected and developed into ulcers. These ulcers of the legs took weeks to heal. The usual treatment consisted in applying a sulphonilamide paste dressing with an elastoplast bandage over it. My patient mentioned above had two large ulcers of one leg and a mucopurulent conjunctivitis with corneal ulceration of both eyes. Swabs taken from the ulcer of the leg and the infected conjunctiva showed staphylococcus aureus to be the cause of the infection of the eyes and the ulcer of the leg. A sulphonilamide paste dressing healed the ulcer of the leg in 14 days but the eyes did not improve appreciably under the usual treatment (silvering of the lids, acriflavine drops, atropine, hot steaming and M.B. 693 internally). I then decided to use the sulphonilamide paste in the treatment of the eyes. This paste was inserted into the conjunctival sac every 4 hours. The results were most gratifying. The patient's eyes improved rapidly. I then used sulphonilamide

paste for all subsequent cases of conjunctivitis amongst the British and Indian troops. The administration of M.B. 693 internally was only reserved for the very severe cases associated with corneal ulceration. The local treatment with sulphonilamide paste was found to be of great value and was adopted in all the military hospitals in Ceylon. No other eye drops were used in the treatment of conjunctivitis. Repeated bacteriological investigations carried out by Major Lucas have shown that the greatest number of cases of conjunctivitis in Ceylon were due to staphylococcus aureus infection. Local treatment with sulphonilamide paste was effective in most cases irrespective of the type of organisms causing the infection. Angular conjunctivitis caused by Morax-Axenfeld bacillus is more often resistant to sulphonilamide treatment but these cases are easily cured with zinc sulphate. Many of our cases had conjunctival swabs taken when they were considered to be clinically cured and were discharged from the hospital. It was then observed that staphylococcus aureus could still be grown in culture from the conjunctiva of the patients who had clinically recovered from a conjunctivitis which was due to staphylococcus aureus infection. Evidently the local action of sulphonilamide is not bactericidal but is bacteriostatic only. Future investigations may show that the sulphonilamide treatment alters the virulence of the infecting organisms although it may not remove them entirely from the conjunctival sac.

Since returning to this country I have used sulphacetamide preparations (drops and ointment) in the local treatment of conjunctivitis. I have found these to give excellent results and slightly less irritating than sulphonilamide paste. Under active service conditions it is often impossible to obtain sulphacetamide powder, drops or ointment. Sulphonilamide is always available and the following paste can be made up in any Army dispensary. The formula of the paste is as follows:—Sulphonilamide powder, 20 per cent., Cod liver oil, 40 per cent. and Paraffin molle, 40 per cent. If sulphacetamide is available this can be used instead of sulphonilamide powder. Medical Officers and ophthalmologists will find this preparation most useful in the treatment of infective eye conditions.

Epidemic punctate keratitis is due to a virus infection. I used sulphonamides in this disease in the form of general treatment or local application but the results were unsatisfactory.

Vitamin B complex (marmite or yeast tablets) or riboflavin administered by mouth or by injection was of great help in the treatment of these conditions.

The natives of Ceylon and India often suffer from vitamin B deficiency as well as vitamin A deficiency. A great deal of disease of the eyes and body will be stamped out in the East when the

authorities embark on the campaign of planned elimination of food deficiency diseases.

I wish to thank the Director-General, Army Medical Services for his permission to publish this paper.

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OPHTHALMIC WORK IN A BRITISH GENERAL HOSPITAL IN NORTH AFRICA*†

BY

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BEFORE going on to talk about eye cases as such, I should like to say something about the set-up and layout of a Military General Hospital, as that was the type of unit to which I was attached.

First of all, what is meant by the term General Hospital? In this country there are few, if any, functioning as such. Most of the hospitals are what is known as "Static," that is they are fixed in a given place, and do not as a rule move with any alteration in troop dispositions. The General Hospital, on the other hand, can if the situation demands it, pack up and move on. In other words it is mobile—that is the essential difference.

If the venue of your activities is to be in the country, in a foreign country, in a tropical or sub-tropical country, in a none-too-friendly country, then you are going to do more than simply set up a hospital, you are going to set up a distinct and up to a point, a self-supporting community, largely dependent upon itself for the maintenance of its own health and well-being, and exactly in so far as that is carried out efficiently, is your success as a medical centre going to depend. It is not much use having a first-class hospital if the staff are going to go down with malaria because of an inefficient anti-mosquito campaign, or with typhoid because the water has been ineffectively treated or with dysentery because your sanitary arrangements have been faulty.

I would stress that all this work has to be undertaken by the unit itself, that is by the medical staff and orderlies, and that, in addition, the whole setting up of the hospital is done by the unit; the putting up of hospital marquees, of theatre tents, special departments, laboratory, store tents, living tents, ablutions, etc. etc. and all the heaving and hauling connected with it, everything up to the stage where each hospital marquee becomes a fully-equipped ward.

You carry your own generator for power and light, your own X-Ray equipment, your own special department equipment, and each person is responsible for the setting up and the efficient functioning of his own department.

In the event of snags and difficulties, you must just make the best of it as there are no expert technicians upon whom you can call.

* Read at a meeting of the Clinical Society of the Royal Eye Hospital, on November 24, 1944. †Received for publication, September 6, 1944.

I would, however, say, that a successful liaison with the Sappers can be a very good and helpful thing.

When you are posted to a General Hospital in process of formation, you are, in this country, told to arrive at a given place at a given time. In my own case I did so, and found that some 32 other medical officers had also arrived, and although quite unknown to each other, we were the staff of the so and so General Hospital, which at that stage existed only on paper.

So that altogether the conditions are a little different from being appointed to a static hospital, where you walk into a nice building and find everything laid on.

As regards ocular conditions themselves in my own cases and in my own notes they are divided into two main groups.

1. *Battle casualties,* in which I include injuries as well as those caused by enemy action as the wounds are of a similar type.

2. *Sick.*

To deal with Battle casualities first, they are sub-divided into two main groups (*a*) severe and (*b*) slight. It is surprising how few there are between the two, and yet that is quite understandable considering the type of missile causing the injury.

Into the severe group I place:

(*a*) Penetrating wounds of the eye with or without prolapse of iris or other uveal tissue.

(*b*) Lacerations of the globe, and deep conjunctival and scleral tears, varying in severity, up to complete disorganisation of the globe.

(*c*) Lacerations of the lids with loss of essential tissue and complicated as such cases usually are, by deep penetrating wounds in the circumorbital region, frequently between the inner canthus and the nose.

(*d*) Burns.

(*e*) Deep penetrating corneal foreign bodies, usually multiple.

(*f*) Intra-ocular foreign bodies.

(*g*) Cases of severe visual depression, where at a glance there is not enough seen externally to account for the visual loss.

It should be remembered that this grouping is entirely arbitrary. and that oftener than not there is a lot of overlapping. A case of prolapsus iridis, or of ruptured globe more frequently than not has also lacerated lids and deep neighbouring wounds with or without retained foreign bodies.

Into the second group of slight injuries are placed such cases as:

(*a*) Corneal abrasions.

(*b*) Superficial foreign bodies, corneal and conjunctival.

(*c*) Slight cuts of the lids and surrounding tissues.

(*d*) Sub-conjunctival haemorrhages and cases where there is a good view of the fundus, revealing no pathology, and the visual acuity is good.

Examination and treatment of severe cases

The procedure that I myself adopted was roughly as follows :-

As soon as possible after the soldier was settled in bed he was seen. Usually you found him with both eyes covered, and before and while you are slowly removing his bandages, it is a great help to have a little talk with him, not only about his wounds but about himself and his affairs. The time is usually well spent in so doing, as somehow you get off on the right foot, and the lad feels that someone has an interest in himself as well as in his wound, and that means a good deal. Having removed the bandages, have a careful look over the whole field before touching anything, noting the condition of the lids, the apposition of lacerated edges, any loss of tissue, or inversion of torn tissue, and noticing the position of any neighbouring wounds particularly in the region of the inner canthus, or between the canthus and the nose. Next, the whole field is carefully cleaned with pledgets of cotton wool out of saline. A canthal wound, if present, is carefully cleaned out, using if necessary a pair of fine forceps, all possible extraneous matter is removed, and buried or distorted pieces of lid skin and lash margin are freed, and if there is the faintest chance of them being viable they are retained and replaced as well as possible.

A blunt-pointed probe about as large as a large lacrimal probe is very gently made to feel its way about any open wound to find any possible superficial foreign bodies. Only when all this is done does one turn one's attention to the eye itself. The lids are carefully separated and the state of affairs found simply by looking. There is very little justification, as far as the globe is concerned, for handling, probing or pressing. A disorganised globe can be seen at a glance, indeed the diagnosis has frequently been made before the lids are open, as scleral and uveal tissue has been seen extruded on to the lower lid. A prolapse of iris is usually easily seen when one has had experience of that sort of thing, even if there is present a full hyphaema. The same applies to lacerations of the cornea and cornea-sclera.

Rather more difficult, and frequently very difficult, are the small perforations with (?) retained intra-ocular foreign bodies, where the perforation has sealed and the tension is normal. Having examined the case in this way, and looked for the presence of a fundus reflex and made if possible an ophthalmoscopic examination, an immediate decision is come to as to whether or not the case requires to go to the theatre, for, for example, abscission of prolapse and conjunctival flap, or for repair of globe laceration, or for the magnet, or for a frill enucleation in cases of torn and disorganised globes.

As soon as this decision is come to the portable X-Ray plant is sent for to examine the whole area for retained metallic foreign bodies.

Examination or inquiry regarding other injuries is made, and if necessary the Surgical Specialist is asked to see the case so that, if any other operative procedure be deemed essential from his view point, it can be done by mutual arrangement at the same time and under the same anaesthetic.

The entire findings are carefully written up on the patient's cards, and you are ready to proceed to the next case.

Whether or not a case of an intact eye but grossly torn lids is immediately operated upon, depends on, first the patient's general condition; secondly, the presence or absence of foreign bodies in surrounding wounds, and thirdly, the state of congestion in the theatres.

Careful replacement and apposition of tissues as soon as possible is in my opinion a desirable thing. Many of these cases are seen with advantage in conjunction with the ear, nose and throat surgeon. So much for gross bulbar injuries.

Deeply imbedded foreign bodies in the cornea which have been driven well into the substantia propria almost up to the endothelium are best left alone and it is my opinion that their future behaviour cannot with any certainty be foretold. I have, over a considerable period, watched such a case with the slit-lamp, and while one or two particles in time found their way to the surface and could be picked out easily, others which appeared of a precisely similar nature remained quite unmoved. Unless they are very numerous, interference with vision is less than one might expect.

In cases where the foreign body, while being firmly held in the cornea, perforates Descemet's membrane and is protruding into the anterior chamber, the condition is different. Such foreign bodies are usually larger that the previous one referred to. I have had two such cases, where pieces of spectacle lens were driven through the cornea and protruded into the anterior chamber. The finest iris forceps could not touch them through the corneal wound of entrance, and indeed this is a dangerous procedure, as you are likely to push the foreign body right into the anterior chamber. In the cases referred to above, I passed a sharp double-edged broad needle into the anterior chamber from the limbus, got the point of it between the lens capsule and the glass and by gently raising the point was able to push the foreign body so far into the cornea that I was able to grip it with a fine toothed forceps from the epithelial surface and remove it, with no subsequent loss of vision. The successful accomplishment of such a manoeuvre twice in succession is more a matter of good luck than good guidance.

Burns

These are mostly severe, and involve the whole face, neck and hands. They are caused frequently in the Royal Armoured Corps by a tank being hit and taking fire inside. They are also very frequent in R.A.F. crashes.

The procedure in such cases was to clean the eye and all the skin as carefully as possible with warm water or saline, instill atropine and a bland ointment between the lids. If necessary the whole area of the face and neck is covered with Tulle Gras or vaseline mesh gauze and dusted with sulphonamide powder, the whole covered by a lint face mask.

I have often wondered what is the ultimate end of cases of burns of the eye that show completely lifeless and ischaemic segments of the conjunctiva and sclera. The hands were cleaned and treated, sometimes with continuous saline drip in a large waterproof bag made like a glove, or alternatively with vaseline gauze and sulphonamide.

Intra-ocular foreign bodies

This is a subject of paramount importance. My own opinion is that they are not so numerous as is generally thought. In my own hands their successful treatment, that is their extraction with recovery of vision has been disappointing rather than otherwise, but in extenuation I think there are many reasons why this should be so.

First of all, a large percentage is non-magnetic and I think that percentage tends to increase. Even if you remove another foreign body from the skin quite near the eye and find it magnetic, that is no criterion that the intra-ocular one is. I have had cases where an intra-ocular foreign body has been found by X-Ray, carefully localised and magnet extraction attempted with no response. The case is at once X-Rayed again under exactly similar conditions and it is found that there has been no shift, yet in at least two such cases when the foreign body was ultimately removed from the enucleated eye, cleaned, and again tried with the magnet it was definitely magnetic. The great difficulty, in my opinion, is localisation. I personally have not had any cases where I could actually see the foreign body. There has always been either a marked localised or generalised haemorrhage and reaction, and its attempted removal has been a question of accurate roentgenological localisation. Given that, then with either the giant or the hand magnet, a direct approach may be made, and if the localisation is good, I think it is even justifiable to insert the point of the hand magnet into the vitreous through an incision in an attempt to get a successful removal.

Localisation in the field, however, is excessively difficult. Sweet's apparatus is cumbersome and is anyhow not in supply, although one American hospital which I knew did have the apparatus in Tunisia. The MacGregor frame depends on the stereoscopic principle with its drawbacks. For this reason I have for some months past, in conjunction with my colleague the radiologist, been endeavouring to devise a rapid and reliable method of localisation by the injection of opaque dyes.

So far the work has been carried out on rabbits and seems to promise quite well.

No case should be given up until several attempts with the magnet have been carried out.

It will be interesting ultimately to read of the end and late results of magnet removal.

Missiles—Their relative frequency and behaviour

In trying to assess the relationships between the type of missile and the numbers of wounds caused by it I find that in my own cases the largest numbers of injuries were caused by the following types of missile in order of frequency :-

1. Mortar fragments—this pre-eminently headed the list.
2. "S," Teller, and other anti-personnel mines.
3. Shell splinters, bomb splinters and extraneous material, such as earth, wood and stone.
4. Rifle, machine-gun and Tommy-gun bullets "303."

The most severely injured cases I have seen, and I think all the cases of bi-lateral blindness I have seen, were caused by exploding mines and booby traps, the most severe case of all, being a young soldier of 19 who had both eyes blown out, his nose split, his face lacerated and both hands blown off above the wrist, as well as abdominal and lower limb injuries.

The behaviour of foreign bodies can seldom in any sure way be foretold, nor can the route they are likely to have taken be in any way deduced from a study of the wound of entry. I am referring chiefly to retained foreign bodies and 303 bullets. I think everyone must have seen the most inexplicable happenings and lack of happenings. I can think of a case where a rifle bullet entered the inferior surface of the ramus of the mandible of the right side, fractured it, passed out through the alveolar margin into the maxilla, into the antrum, fracturing the outer wall, out of the antrum above, missing the globe of the eye entirely, and ending up by burying itself in the frontal sinus of the same side, with no reason as far as I could see, why or how the eye was actually avoided.

In another case, a 303 bullet passed in at the right canthus with

sufficient velocity to make only a tiny wound of entry. X-Ray showed the bullet to be in the nose, high up on the same side. The odd point was that the X-Ray showed the bullet to be pointing outwards, instead of in, and secondly the patient's only complaint was of diminished vision in the opposite eye, which showed on examination definite traumatic change and haemorrhage in the lower part of the fundus.

Quite apart from the eye I saw a case where a bullet entered the neck in the region of the great vessels, appeared to pick its way carefully among the fascial planes and bury itself in a cervical vertebra without doing any other discoverable injury to anything.

Quite the most remarkable case of a foreign body in this area which came under my care was one in which there was a wound in the left inner canthus, extending fairly deeply and involving the inner quarter of the upper and lower lids, including the puncta and the caruncle. The eye itself on that side was undamaged, and the patient had no complaints to speak of, although he was dripping from his nose what I took to be cerebro-spinal fluid, which led to the query of injury to the crista. Nothing was felt with the probe, and the case was at once X-Rayed. The visual acuity of the right eye, that is on the side opposite to the wound was grossly diminished and no fundus reflex was seen. This was presumed to be due to intra-ocular haemorrhage. The tension of the eye was normal. The X-Ray picture showed a foreign body of relatively colossal proportions lying on the left side involving the floor of the orbit, the greater part of the maxilla, and extending from the nose outwards to the zygoma, and extending far backwards. Its removal was attempted and presented very great difficulties, as it was firmly wedged into position, and there seemed no direction large enough to get it out, and it could not be turned in any way. The assistance of the ear, nose and throat surgeon was a great help, and although it was ultimately removed by an incision extending over the lacrimal sac region, and sweeping down and out across the maxilla, turning back a large flap, it was at one time so difficult that a modified Krönlein was for a moment contemplated. On removal it measured two and a half inches by one and a half inches by one inch. The wound healed although I don't quite know what happened inside, but when he was sent on to the base later for further examination he was very fit. This foreign body with the notes and X-Ray were sent home to the Imperial War Museum.

It is difficult to remember all one's cases at once as they were very numerous, but I should like to put on record one case of complete bi-lateral blindness from a gun-shot wound of the occipital region, which wound at the time when I saw it was in a state of fungus cerebri.

Two cases of blindness due to vitreous haemorrhage which looked as though they might well go on to retinitis proliferans. In neither case was there in either eye any sign of injury, and, in each case, the history was that the man had been blown up, and it was assumed that the eye condition was the result of blast.

One case of septicaemia and cavernous sinus thrombosis (seen and diagnosed by several physicians and surgeons) was in the recovered state when I saw him except that he still had a contralateral sixth nerve palsy. The recovery was attributed to the use of penicillin (July, 1943). Severe orbital cellulitis was encountered twice only, once following a compound gunshot wound involving the outer wall of the orbit, and once following one of my own enucleations for endogenous panophthalmitis.

In all that I have said so far I would ask you to bear in mind that although we were a very large hospital having as many as 1,700 beds occupied we were relatively far forward and during the campaign in N. Africa and later during the campaigns in Sicily and Italy we functioned exclusively as a casualty clearing station. Patients came at all hours and in large numbers, sometimes as many as 400 at a time. They had to be dealt with rapidly and evacuated quickly to make room for the next lot. Treatment had therefore to be modified accordingly. Evacuation was by ambulance, train and air.

Finally the second group of cases, namely the *Sick*.—Those people whose ocular condition or complaint was not attributable to enemy action, battle casualty or injury.

A very striking thing is that during a campaign the numbers of sick are relatively low, and they really are sick. After a campaign and between campaigns when divisions come back to rest, the numbers immediately go up rapidly, and the nature of the cases alters considerably. In other words, while active operations are going on the soldier has a lot to think about in addition to himself. But during a resting period he can really get down to some serious introspection, and carefully overhaul himself. I do not mean that the bulk of the cases are functional, very much the reverse. The point I would make is that during active operations it is amazing with what disabilities some people are able to carry on, septic hands, multiple desert sores, etc., even under very adverse conditions of personal discomfort and privation.

The cases seen in this second group of sick are divided into:

(*a*) Cases with objective findings, by which I mean that something was found to be amiss with the eye or its adnexa on examination.

(*b*) Cases with only subjective symptoms. Taking this in its broadest sense I included all cases of refraction. [The actual number seen in each of those groups was very large indeed.]

In the first division the types of cases seen in the order of frequency were: (*a*) Conjunctivits in all its forms. (*b*) Ulcerative keratitis in its most common form. (*c*) Blepharitis. (*d*) Corneal abrasions and foreign bodies. (*e*) Meibomian cysts and hordeola. (*f*) Iritis and iridocyclitis. (*g*) Non-purulent keratitis: Superficial punctate; Acne rosacea; Disciform; Interstitial. (*h*) Trachoma. (*i*) Symblepharon.

The cases under *a*, *b*, *c* and *d* were very numerous, the others less so, and not, I think, more relatively frequent than in civil practice. I did not see one case of acute dacryocystitis, nor did I see a case of ocular myiasis.

The commonest type of conjunctivitis was rather different from what one has been accustomed to see, in that the bulbar conjunctiva was nearly always involved and showed numerous small areas of haemorrhage of the flame-shaped type, almost like a resolving sub-conjunctival haemorrhage. These were very numerous near the limbus, and numerically varied with the severity of the case. The best form of treatment ultimately decided upon was simply to paint the lids with silver nitrate, followed by a simple irrigation and ointment. Both eyes were usually done at a sitting and repeated in 48 hours if necessary. Dark glasses were given if required. Recovery was a matter of about a week. From local Arab oculists I learned that this condition is one of their most lucrative forms of income, and that what little of their faith is not placed in Allah, is entirely invested in silver nitrate. Repeated examination showed the white staphylococcus to be the usual organism present.

The corneal ulcers were frequently of the multiple marginal type and responded well to the exhibition of vitamins and dietary adjuvants.

The cases of trachoma were mostly in Italian prisoners of war, or in the local Maltese Labour Battalions, although one or two primary cases were suspected in our own troops and quite a number were reported in a personal communication from the Americans. The treatment adopted was:

1. Segregation. 2. Sulphonamides by mouth. 3. Silver nitrate to the lids.

Copper was not much used. This is a common disease among the Arabs and I believe that the results of sulphonamide therapy are very satisfactory.

With the second division of the sick group, namely the *subjective cases*, it is a little more difficult to deal. Straightforward cases of refraction were dealt with at once and the soldiers supplied with spectacles on the spot; one, two or even three pairs as the case merited.

While on this subject of refraction I should like to state that after examining a large number of cases over a relatively long period I formed the opinion that myopes in sub-tropical countries tend, with a definitely less strong lens, to get as good vision as they previously had, and that low myopes who required a correction to get 6/9 or better, could read 6/6 easily without a correction. This occurred so consistently as to impress itself upon me. I have not, I am afraid, a scientific explanation to offer. It might be partly that the bright light causes a smaller pupil or that these men had become accustomed to gazing into the wide open spaces and leading an outdoor life. One was able to check the soldier's previous correction from that document known as A.B.64 Pt. 1.

For the most part the other cases which were not refraction complained of:

1. Eye ache; 2. Eye strain; 3. Headache; 4. Difficulty in driving at night; 5. Difficulty of reading in the evening; that is difficulty in maintaining accommodation just like a commencing presbyope, although the majority were quite young men. Each case of headache had his refraction done, his fundi examined and his field of vision checked to exclude any ophthalmological evidence of any organic cause. Very seldom was anything found to which the symptoms could be attributed. I have frequently been asked if any of these cases were functional. That is a very difficult question to answer, as there are always a few "old soldiers," no matter what their age is. On the whole, I am of the opinion, that these cases were not functional in the ordinary sense, that is to say, they were not without some little basis of cause. These men were in the open all day long, in great heat and exposed to a relentless sun, with unrelieved glare all the time. They had no protection, no dark glasses, no sun helmets, not even the little protection provided by the peaked cap, their headdress being the official cap F.S. Drab or "For and Aft." They were forced to keep their eyes screwed up all day, and in going into a tent or bivouac they were quite unable to see anything during the period of adaptation, and this in many undoubtedly produced a condition of eye-consciousness. With the advent of the winter months there was a noticeable falling off of such cases. Nearly all were helped by a little talk and the assurance that their eyes had just been carefully examined and found healthy, and the proof that their visual acuity was good.

In a few cases for psycho-therapeutic reasons it was deemed advisable to give dark glasses for a little time.

True night blindness, retinitis pigmentosa, was found on two occasions, and in one or two cases the defective vision was due to myopic degenerative changes at the macula.

I should like to refer back and say that in cases of severe

bilateral eye injury, unless I felt tolerably certain that a certain amount of vision was present, I did not ask him how much he could see because of the adverse psychological effect this had in cases of complete visual loss.

Discussion

Following this paper Major OLIVER said that he proposed to alter the plan of the meeting somewhat. Major Cameron had raised several points of great interest as regards "follow-up" and he felt that it would be valuable to have a discussion instead of proceeding immediately to the next paper. Major Oliver thanked Major Cameron for his most interesting paper and said that he noticed several members who had seen foreign service present: he hoped that these members would give their comments on Major Cameron's paper and in addition any general experiences which they might care to relate would not be considered out of place. As regards the question of follow-up of severe burns and foreign bodies mentioned by Major Cameron, Major Oliver suggested that members of the E.M.S. who were present should deal with this point.

Captain G. C. PRITCHARD, R.A.M.C., said that after many months in a static unit in which he faithfully noted refractions in the soldier's pay-book he was delighted to hear from Major Cameron that notes in that document known to the Army as A.B. 64 part 1 had been found of value. Later in a forward B.L.A. Hospital he has found the main problem to be one of disposal of large numbers of cases, many trivial. The Army machine was in the main extremely efficient. A job he (Capt. Pritchard) rather enjoyed was the construction of temporary artificial eyes to replace those accidentally broken. This he did in conjunction with the Dental Surgeon. They first made a stent mould of the socket. This was then used to make a plaster impression. Finally he used acryllic resin to make a plastic prosthesis. With this makeshift the soldier could carry on comfortably for many months if necessary.

Major J. MINTON welcomed Major Cameron's emphasis on versatility. He himself had been a little worried by having to do most of his work in Baghdad in the local optician's shop. He had been impressed by the small number of Europeans in Baghdad who had developed trachoma. Like Major Cameron he had seen good results in trachoma from sulphonamides. In Ceylon he had been interested to find much superficial punctate keratitis in natives but little in Europeans.

Dr. W. T. C. LUMLEY said that from his Horton experiences he would agree with Major Cameron that the end results of intraocular foreign bodies were disappointing. Even when removed retinitis proliferans or detachment was liable to ensue. The occasional spectacular success was sufficiently frequent to encourage active surgery. Glass injuries as had been seen following flying-bomb injuries had been most depressing.

Mr. L. H. SAVIN also thanked Major Cameron for a stimulating paper. He himself had found the method of localisation best in which the foreign body was placed by its relationship in anterior and lateral X-ray pictures to a ring of known size stitched to the conjunctiva concentric to the limbus. He would qualify the general gloom regarding non-magnetic intraocular foreign bodies by saying that the results were generally good where the foreign body was in the anterior segment of the eye. He had once extracted a piece of copper from the vitreous under ophthalmoscopical guidance and using a small crocodile forceps through the scleral perforation. The patient got 6/18 vision and he felt very pleased with himself, until Miss Orr-Ewing showed him the patient after 2 years with a retinal detachment. The cases he liked least were the people with bilateral optic nerve injuries. He had seen three since D day. While agreeing with Major Cameron that versatility was necessary in military surgery he confessed alarm when on occasion he had to deal with wounds involving frontal lobe or even that capacious cavity the antrum, from which he had one day fished out a completely severed upper lid, carried into the tissues by shrapnel. He wondered whether the good results quoted for suphonamides in trachoma were not due merely to clearing up the concurrent secondary infections.

Professor SORSBY said that doubt about the efficacy of sulphonamides in trachoma nowadays savoured not of reasonable scepticism, but of purblind and almost half-witted obstinacy. He had been able to cure all his recent Swanley cases by

sulphonamides and local painting of lids with sodium sulphacetamide. It was a mistake to assume that just because a disease was of virus origin sulphonamides would not help it.

Major J. O. OLIVER said this appeared to be the place to mention penicillin. He had seen a case of cavernous sinus thrombosis with staphylococcal meningitis recover with penicillin. There was a very definite sphere for penicillin in eye work. Major Oliver then called on Dr Rowland Hill for his paper.

Dr. T. ROWLAND HILL said that as a physician he would confine his remarks to that portion of Major Cameron's paper in which he so wisely stressed the importance of general medical hygiene. After six months in a rather frowsy static hospital, the recondite wisdom of the Army Council had seen fit to transport him to tropical Nigeria. Here conditions were apt to be primitive. On one occasion he was forced to live for seven days on a diet consisting of tinned cherries. He paid a high tribute to the negro inhabitants of Nigeria. In spite of some African "*trickiness*" he had found their financial and other morals the equal of those he had known in Harley Street. At first he had been posted to a hospital for native troops, where his ignorance of the language had necessitated methods akin to those of a veterinary surgeon. Sanitary conditions were poor in that "white man's grave." At Ibadan, the greatest city of Africa, he had found a town of corrugated iron with only one lavatory to every 3,000 persons. A Welshman had been elected by the local population as its kinglet. Malaria was rife, and the only cows in town were kept behind mosquito netting. Malignant tertian malaria was everywhere with its cerebral, cardiac and intestinal complications. He saw much blackwater fever. Infantile mortality was 50 per cent. among the natives. Intravenous quinine was often necessary. Immunisation against yellow fever was fairly effective. Poverty was dreadful. He had not been surprised at the popularity of palm wine as a means of dulling sensibilities. This beneficent liquor was already high in alcohol content, when tapped from the parent palm trunk. Dr. Hill showed the society many pleasing examples of native carvings in some of which could be noted the omnipresent West African condition of umbilical hernia.

SOME OBSERVATIONS ON A TENDENCY TO NEAR-POINT ESOPHORIA, AND POSSIBLE CONTRIBUTORY FACTORS

BY

Major D. D. STENHOUSE STEWART, R.A.M.C.

IN spite of the interest devoted to it by competent observers during the past hundred years, there are many aspects of the physiology of vision which offer scope for further elucidation by simple experiment, mass observation, and statistical analysis.

Medical Officers in Industry and in the Services are better placed than many of their colleagues for purposes of this kind, as it is a simple matter for them to obtain a more general sample of the population to serve as "controls."

The study by Mann and Archibald (*Brit. Med. Jl.*, 1944, Vol. I, p. 387) of a group of 28 women satisfactorily employed in extremely fine work in a factory is an excellent example of opportunities constantly available to extend the limited knowledge and

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ascertained fact affecting comfortable near vision. That article confirms the author's opinion that *as a generalization*—to be accepted with caution—the comfortable binocular performance of sustained close work is associated with an appropriate eye-muscle balance at the working distance, a state of euphoropsia which can be defined as some degree of exophoria in the presence of sufficient power of voluntary convergence, and especially of relative convergence, ample to overcome it.

This fulfils the accepted hypothesis of associated accommodation-convergence innervation, supplemented by additional cortically-controlled impulses of the " convergence centre " in Perlia's nucleus; divergence, independent of the state of accommodation, is believed to arise only by inhibition of convergence (Duke-Elder, Vol. I, p. 288). If the total of convergence is excessive for the degree of accommodation, a situation manifest as near point esophoria (possible causes of which will be discussed), comfortable clear binocular vision can be attained with the help of convex lenses, whether for correction of actual hypermetropia, assistance of presbyopia, or, in younger people, the restoration of a more natural accommodation-convergence relationship.

A rational basis can be evolved for recognition of the occasion and estimation of the amount of extra " plus " correction to assist the patient, it should displace the routine addition of +0·50 D. sphere binocularly to the carefully assessed monocular prescription, a habit which can be ascribed to accidental relief attending this practice in chance cases of unrecognised esophoria.

These accidental successes do not warrant the unnecessary expense to a poor patient consequent upon the *empirical* prescription of + 1 D. sphere each eye as a placebo to any young emmetrope complaining of discomfort in near work, for it should be remembered that visual symptoms of an indefinite nature ascribed to close work may indicate no more than a desire to escape with honour from circumstances directly or even indirectly related thereto. Furthermore, it is those whose indigence is an index of lower intelligence and weaker psyche who are most lacking in sense of value and sales-resistance when selecting elaborate frames and tinted toric form for their weak lenses. Psychological possibilities deserve particular enquiry when negative ocular findings cast doubt upon a visual basis for the patient's complaint.

Previous experience had led the author to believe that two or more dioptres of exophoria represented the " normal " near point muscle balance (at 33 cms.) with orthophoria as an upper "safety" limit of comfort. When recently he had occasion to measure and record for service purposes the stereo. sense and binocular balance of numbers of men (most of whom had been engaged, without ocular complaint, as architectural or technical draughtsmen, clerks,

or artists in civilian life), the findings were surprising in certain respects which will be considered.

These men were examined after half an hour's critical test of stereo. sense, by six pairs of stereo. slides of increasing difficulty viewed, each for five minutes, through a stereoscope consisting of a pair of strong plus lenses (without prisms) at a distance of some three inches. Each pair of slides rested on a horizontal sheet of glass illuminated from below: each slide of a pair was independently and freely movable and the candidate adjusted them to suit himself. All but a few of these men had no previous acquaintance with a stereoscope; their tendency to accommodate and therefore to converge for the known position of the object rather than for its distant virtual image was manifest by the necessity to approximate the paired slides in the accomplishment of fusion.

The unusual esophoria in patients examined at a variable interval after supreme and anxious effort of this kind is shown in the following table:—

Near Point Phoria in Prism Dioptres of 125 Service Personnel After Sustained and Dissociated Binocular Effort

Exophoria							*"Normal" Range*			*Esophoria*						
16	14	12	10	8	6	4	2	1	0	2	4	6	8	...	...	16
1	2	2	4	9	10	17	27	5	18	17	9	2	2			(1)
Total 45 = 36%							50 = 40%			30 = 24%						
Mean phoria 5·8 D.exo.										2·3 D.eso.						

Grand Total:—125 men; mean phoria 2 D.exo.

That the mean phoria corresponds exactly with that which the author accepts as physiological is due to the large preponderance of findings in the vicinity of this value. The one case with 16 D. of esophoria has been ignored, although he showed excellent stereo. sense, to discount any possible prejudice in favour of the hypothesis under examination. It will be agreed that a finding of esophoria in 24 per cent. of a sample selected mainly on their previous efficient performance of close work is outside normal experience, and demands explanation.

It was therefore postulated that an unaccustomed demand upon sustained convergence, especially when this function was dissociated from accommodation by the circumstances of the task, could, in the period of half an hour, create a near point "tonic" esophoria of a nature probably transient.

Miss Mann in a personal communication has informed the author that the subjects of her examinations were tested fairly early in the morning (9.30 to 10 a.m.), at a time when any abnormal or

" tonic " esophoria residual from the previous day would probably have disappeared in sleep, and before their customary task at normal distance would have re-engendered it, if, indeed, such postulate applies to experienced workers.

At the next session of stereo. tests the " resting " near point muscle balance of each man was assessed on first arrival either at 10 a.m., or, after a lunch interval, at 2 p.m.; it was compared with findings taken as each man presented himself within a quarter of an hour of completing the test (or failing by the way) for refraction, phoria, vergence examination, and to have his stereo. capabilities recorded. The results are as follows :—

Near Point Muscle Balance of 73 Men Before and After Test

BEFORE

	Exophoria			*"Normal" Range*			*Esophoria*		
Phoria (Prism Dioptres)	8	6	4	2	1	0	2	4	6
No. of cases	4	5	14	34	5	5	5	1	0
Total	23 = 31·2%			44 = 60·3%			6 = 8·5%		
Mean phoria ...	4·0 D.exo.						1·3 D.eso.		

Grand Total 73. Mean phoria 2·3 D.exo.

AFTER

	Exophoria			*"Normal" Range*			*Esophoria*		
Phoria (Prism Dioptres)	8	6	4	2	1	0	2	4	6
No. of cases	6	4	10	18	6	7	12	8	2
Total	20 = 27·4%			31 = 42·5%			22 = 30·1%		
Mean phoria ...	4·6 D.exo.						2 D.eso.		

Grand Total 73. Mean phoria 1·0 D.exo.

The mean change of 1·3 prism dioptres in the direction of esophoria is less obviously significant than is the reduced number of those falling within the " normal " range, and the increase of esophores from 8·5 per cent. to 30·1 per cent. of the whole. The following table indicates the source and manner of this fluctuation within and between the groups.

Pre-test Grouping	*>2 D. Exophoria*			*"Normal" range 0, -2 D. Exo.*			*Esophoria*		
Change after Test									
Direction	Eso.	Nil.	Exo.	Eso.	Nil.	Exo.	Eso.	Nil.	Exo.
No. of cases	14	3	6	23	10	11	6	0	0
Amount :—									
Mean	2·5 D.	—	2·7 D.	2·9 D.	—	1·7 D.	1·7 D.	—	—
(Maximum)	(5 D.)	—	(5 D.)	(6 D.)	—	(6 D.)	(4 D.)	—	—

Of the increase of 16 cases in the esophore group, 14 are contributed from those previously in the normal range, one formerly showed an exophoria of 3 D. and one of 4 D. It is noteworthy that every case primarily esophoric showed an increase of esophoria.

The following table shows the original data from which the above analysis is compiled :—

Distribution of 73 Cases According to Phoria in the "Resting" State

Exo. (+)									*Eso.* (+)			
8	6	5	4	3	2			1	0	1	2	4
+4	+4	+3	+5	+4	+6	+1	−1	+3	+3	+1	+4	+2
+3	0	−3	+4	+2	+6	+1	−1	+3	+2		+1	
+2	−1		+2	+1	+5	+1	−1	+2	+2		+1	
0			+2	+1	+4	+1	−1	−1	0		+1	
			−2	+1	+4	0	−1	−2	−1			
			−4	+1	+4	0	−2					
				0	+4	0	−2					
				−5	+4	0	−6					
					+2	0						
					+2	0						
					+2	0						
					+2	0						
					+2	0						
Total Cases 4	3	2	6	8		34		5	5	1	4	1 = 73

The figure (+ or −) represents the direction and number of prism dioptres by which the man's phoria is displaced after close work of the nature described.

Discussion

It is believed that these data are sufficiently significant in a qualitative sense. At the present stage nothing further is claimed, except that there is scope for more carefully controlled work with less selected samples of larger numbers in differing circumstances, grouped and correlated according to age, sex, refractive error, occupation, intelligence, and "psychological type."

Opportunity has not seriously been taken yet to estimate the part played by anxiety, either in those over-eager but inexperienced or in those of a naturally anxious or obsessional temperament. It is possibly an important factor, especially if we would construct any hypothesis applicable to the less artificial conditions of everyday life and seek to explain the development of excessive near point convergence.

Chavasse (Worth's Squint, 7th edition, chapter v) considers that the binocular attitude is attained and conditioned by reflex

development subject to many possible disturbing influences. It is not reasonable to assume that the ocular phoria at any age is an inelastic constant; it can be affected by emotional disturbances in the sense of esophoria, and even transient (or permanent?) esotropia. In years of presbyopia, physiological needs outweigh emotional effects though the latter may still be determinant especially in those who acquire compensation neurosis and in some women. One must prefer Duke-Elder's statement (Text Book of Ophthalmology, Vol. 1, p. 763) that convergence is *not* normally impaired in presbyopes, to the contrary one of Chavasse (p. 174). Why should it be impaired? The decline in power of accommodation is due not to diminished ciliary effort or innervation but to the reduced elasticity of the crystalline lens which fails adequately to respond. A presbyope without his spectacles is, in fact, esophoric at the near point—regardless of his ability to read Jaeger 1 unaided—he needs, and will appreciate, a plus addition which creates that slight exophoria which leaves scope within the "safety" limits for convergent stimuli, emotional or occupational.

So also will the workman, civilian, or soldier of forty-odd who suffers cranial or even bodily injury, and states that he could "see to read perfectly before"; a claim for the original cost of provision of such spectacles is not so irrelevant as it might at first appear.

Summary

A short period of exacting close work in special conditions of binocular dissociation is shown to cause a change of a temporary nature in eye muscle balance at the near point (33 cms.) assessed by normal routine methods.

It is implied that the near point muscle balance cannot accurately be stated without reference to manner of use of the eyes preceding the assessment.

If it can be assumed that man is deficient in natural power of voluntary divergence to counteract accommodative esophoria, it follows that in the "resting" state "near-point" exophoria of some degree accompanied by adequate reserve power of voluntary convergence is desirable for the comfortable performance of sustained close work.

It is further suggested that in some cases temporary disturbance of this balance and of comfortable near-point effort can arise from emotional causes, especially if aroused by close work and related to anxiety about its successful performance.

HEAD INJURIES FROM THE OPHTHALMOLOGIST'S VIEWPOINT *

BY

Captain ARTHUR D. ECKER

and

Captain EUGENE W. ANTHONY

MEDICAL CORPS, ARMY OF THE UNITED STATES

INCREASED mechanization of both civilian and military activities has yielded a large number of blunt head injuries. Instead of presenting a systematic review of the ocular evidence of head trauma[1] the present paper will touch on some of the newer concepts concerning such injuries which may be of interest to the consulting ophthalmologist. First comes the importance of the proper state of mind in which to approach such patients.

Prophylactic psychotherapy

The picture of the late results of blunt head injury has been painted blacker than it really is[2]. The vast majority of both civilian[3] and military[4] personnel return to their full duties in a matter of weeks, under proper management. The most important treatment in these cases is what has been called prophylactic psychotherapy[5]. The patient must not be frightened. Many physicians forget that head injury is an acute emotional as well as an acute physical crisis. Fear may be transmitted to a suggestible patient by a gesture or tone of voice, and unduly prolong an otherwise brief convalescence. Let us approach these patients in an attitude of calm reassurance.

Hutchinson's pupil and the tentorial pressure cone

The fixed dilated pupil of Hutchinson, while uncommon, is of great importance. In this condition, involving the pupillomotor fibres of the third cranial nerve, the pupil is fully dilated and does not contract when a bright light is shone into it or into the opposite eye. If, on the other hand, the consensual light reflex is present, one may be dealing with an eye blinded by intra-ocular haemorrhage or severance of its optic nerve. But the fixed dilated pupil is an infallible sign of raised intracranial pressure[6]. It is usually due to a laterally placed intracranial lesion of the same side, which most often is in the temporal but may be in the frontal or parietal lobe. The pupillary change is caused by herniation of

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the medial part of the temporal lobe into the tentorial notch, the so called tentorial pressure cone[7]. This herniated portion of temporal lobe is said to pinch the ipsilateral oculomotor nerve, but is more likely to act by displacing and rotating the midbrain in such a way as to exert traction on the nerve. In any event, the resulting dysfunction of the nerve affects its pupillomotor fibres before obvious impairment of the nerve bundles to the extra-ocular muscles.

The underlying lesion may be a haematoma of any type, epidural, subdural, intracerebral or even contusion and swelling of the brain. This same mechanism may progress to compression of the mid-brain and occlusion of the aqueduct, thus leading to acute internal hydrocephalus and papilloedema[8]. If the process is slow, there may result on the *same side* as the lesion, hemiplegia, which is caused by impingement against the tentorial notch of the contralateral pyramidal fibres in the mid-brain above their decussation. Below this level, in the medulla, they cross over to the side of the haemorrhage. Thus, the association of a dilated fixed pupil with a homolateral hemiplegia of late onset is indication for intracranial exploration on the same side.

The mid-brain syndrome

Bilaterally dilated fixed pupils soon after a head injury indicate a bad but not hopeless prognosis. If they are associated with neurogenic hyperthermia, rapid pulse, quickly rising rectal temperature, with a cold skin and decerebrate rigidity, there is damage to the mid-brain. The prompt intravenous administration of plasma and deliberate cooling of the skin may result in dramatic improvement[8]. Recently the intravenous use of soluble pentobarbital has been recommended for such states[9].

Argyll Robertson pupils of traumatic origin

It is worth recalling that Argyll Robertson pupils may result from head injury. The lesion in these cases may be either in the central nervous system itself or in the peripheral efferent pathway to the pupil. In the latter case only one eye is likely to be affected, and the lesion is presumably in the region of the ciliary ganglion, through which run the nerve fibres for the light reflex. On the other hand, the nerve fibres concerned in the accommodation-convergence reflex probably run from the oculomotor nerve, perhaps along with the branch to the inferior oblique muscle and then to the ciliary muscle, without passing through the ciliary ganglion[10].

Lesions of the temporal lobe

In the study of lesions of the temporal lobe, one can use routine clinical study, roentgenologic methods (including plain films, ventriculograms and cerebral angiograms), as well as observation of the following functions: (*a*) visual fields; (*b*) speech (if the temporal lobe of the dominant hemisphere is under consideration); (*c*) electro-encephalograms; (*d*) caloric nystagmus. Problems of perimetry will be mentioned later in this paper. It has been shown that the electro-encephalogram, when used as an index of active cerebral abnormality after a head injury, will help to estimate the extent of the cerebral damage[11]. There has been some work correlating electro-encephalographic changes in the occipital lobe with visual field defects. The electro-encephalogram has also been found helpful in the diagnosis of hysterical amblyopia. Directional preponderance of caloric nystagmus to the side of the lesion is present when the temporal lobe (but not other parts of the brain) is involved[12]. Thus, something of the function of a temporal lobe can be determined by tests in the ear of opposite side, even if the eardrum on the affected side is perforated.

Extra-ocular muscles

Due to the dominance of fusion, partial paralysis may go unnoticed unless examination of the extra-ocular muscles is done by some form of occlusion. The most simple form is the cover test which is easily performed, even with the patient in bed, by means of a flashlight bulb and a folded piece of paper. Should there be phoria in any of the six cardinal positions, prisms may be used to determine the field of greatest deviation, and the affected nerve or muscle may be designated. If of sufficient amount, the paralysis gives rise to double vision, and in these cases charting the diplopia fields is useful in following recovery.

The location and nature of the neural lesion in any muscular palsy is of interest. When recovery occurs within a matter of days, the nerve has been injured in a process akin to concussion, whereas if months are required, presumably the axons have been torn and have regenerated in an intact nerve sheath. If no recovery occurs one can assume either severance of the nerve, severe damage to its blood supply, or such firm scarring that regeneration is prevented. The mechanism of these injuries may well be traction on the nerve by the shift of cranial contents at the time of injury. Since the rate of regeneration of human nerves is about 1·5 mm. a day, after a latent period of 30 days, the approximate site of the lesion may be calculated from the time of recovery. Furthermore, individual muscles, especially the oblique, may be

affected at or near their attachment to the orbit, and in such cases fracture of the bone is to be suspected.

Patients who have suffered from head injuries frequently complain of blurring of near vision during convalescence. They seem unduly concerned about their eyes and frequently seem to have difficulties of accommodation. When they are encouraged to use their eyes and to resume normal physical activities, these complaints usually disappear promptly. For the relatively few patients whose accommodation or convergence are subnormal, as tested objectively, exercises are indicated. These may consist of simple convergence movements stimulated by a pencil and gradually prolonged periods of reading. Furthermore, in cases of paralysis of one or more extra-ocular muscles, orthoptic exercises should be encouraged. Even in the instance of a completely paralyzed muscle, these procedures, acting on the other extra-ocular muscles, will result in passive movement of the affected muscles and improvement in its blood supply. Such activities help prevent atrophy of the affected muscle and contracture of the antagonist while the nerve is regenerating.

Visual fields

Study of the fields is of importance in head injuries when the patient is able to co-operate for rough tests, and even more so when he is able to sit up and face the perimeter and tangent screen. Fields should be determined with test objects yielding various visual angles in order to learn something of the activity of the lesion which is affecting the visual pathway. This activity will be gauged not only by the slope of the field at any one time, but also by changes in the field from time to time.

Involvement of the *optic nerve* at the time of injury may result in variable amounts of visual loss, and is probably due to involvement of the blood supply. A late effect of trauma to the optic canal is overgrowth of bone callus, which can be recognized early only by the use of quantitative field studies. There may be annular scotomata in these cases[13].

The *optic chiasm* may be affected in head injury probably due to damage of small vessels and ischaemia of the nerve fibres[14]. The most characteristic perimetric changes are bilateral temporal field loss or total blindness in one eye and temporal loss in the other. Other changes may be quadrantic or scotomatous, especially if the lesion is near the anterior chiasmal angles, where involvement of the upper temporal field of the opposite eye is due to a lesion of the " knee " of crossed fibres coming from the infero-nasal portion of the retina[15, 16]. With obvious field changes in one eye (including blindness) it is, therefore, especially important to do a complete field study of the other side.

Perimetric changes may be slowly progressive from the start, or may appear later as a result of chiasmal adhesions, so-called traumatic arachnoiditis. The field changes in such lesions are not characteristic but a central scotoma with a hemianopic defect of the peripheral visual field, especially if bitemporal is suggestive[17]. It is most important to remember that changes for the worse which occur some time after the original injury are evidence of an active pathological process. Operative intervention in such cases is often gratifying[16].

Damage to the radiations causes incongruous homonymous visual field defects whereas occipital lobe lesions are congruous. Visual field studies in cases of blunt trauma to the frontal region have demonstrated injury to the occipital lobes which might otherwise have gone unnoticed. These changes may be transitory and manifest only in the first few weeks following the trauma. In other cases the defects are permanent, and are usually in the form of small homonymous scotomata near the central area. The probable mechanics of such injury, rotation of the skull in the horizontal plane, has been recently illustrated[18].

The presence of normal visual fields does not exclude the possibility of a slowly growing subdural haematoma overlying the optic radiation. Although such a lesion is intracranial, it is actually outside the brain substance and may progress so slowly as not to impair the function of the nerve tracts. Thus, there is significance in the presence of normal visual fields in a case of suspected subdural haematoma with significant lateral shift of the pineal body, or appropriate changes in the spinal fluid[19].

Summary

The basis for a few ophthalmic syndromes associated with closed head injuries has been presented in the light of modern neurology. Special attention has been given to disturbances of the pupils, extra-ocular muscles, and visual fields.

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TRANSPARENCY OF THE LENS FOLLOWING TRAUMATIC CATARACT*

BY

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IT is well known that the typical posterior cortical cataract due to contusion or perforation of the lens sometimes clears up completely. This particular form of opacity in the lens depends on the entrance of fluid underneath the capsule and between the lens fibres. The vacuoles thus formed are of a refractive index different from the lens substance and the lens appears opaque although its fibres are still transparent. At this stage the vacuoles may be absorbed and the "cataract" appears to resolve.

The case to be described presents a most unusual picture in addition to this phenomenon.

A West African negro, aged 25 years, presented himself in the out-patient department with a note from his Medical Officer saying that his left eye had been injured by a flying particle of stone. The report stated that the stone splinter had been seen in the cornea and that a small hyphaema had been present. At the time of the examination, however, several hours after the

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injury, only a small corneal abrasion was observed and the anterior chamber was clear. Otherwise the eye appeared normal, with the exception that an anterior capsular cataract was present. Exactly the same abnormality was seen in the other eye. The normal fundi were clearly visible and the visual acuity was 6/6 in both eyes. It was assumed therefore that the stone splinter had been washed off the cornea and the patient was treated as a corneal abrasion. On the next day the abrasion was nearly healed, the pupil well dilated with atropine and two days later the eye was almost quiescent.

Three days after the original injury the patient came again, complaining of violent pain in his left eye. On examination a

most ,surprising picture presented itself: A brilliantly white mushroom-shaped mass was protruding from the lens into the anterior chamber. There was a marked ciliary injection and the intra-ocular pressure was 40 mm. Hg. X-ray of the eye showed no radiopaque foreign body. The tension could be lowered by cautious massage of the eyeball and application of heat. The eye settled down during the next days with no further accidents.

On the sixth day the opaque lens masses had markedly diminished in size and the next day they were less than half the diameter of the original mushroom. A normally transparent lens was visible behind them. This surprisingly quick absorption of the opaque lens masses continued rapidly, and 13 days after the injury only a few very fine, grey capsular opacities were left, surrounded by brown iris pigment. At this stage a feathery posterior cortical cataract was observed, the vision being 6/60. This, however, cleared up almost completely, and on the 23rd day the eye was again white and perfectly normal apart from the unchanged anterior capsular cataract and a fine corneal opacity near the centre. Only with the slit-lamp some fine, linear opacities could be observed in the anterior capsule. Vision was 6/6 and retinoscopy revealed emmetropia.

It might be assumed that the stone splinter had actually perforated the cornea and the lens and disappeared somewhere in the periphery where it could not be seen; as most stone splinters are not radiopaque the negative X-Ray findings do not contradict this conception although the aspect of the lens on the day of the

injury makes it highly improbable. If no perforation had taken place the contusion alone of the eyeball might have produced a rupture of the capsule. In both cases it is difficult to explain the delay of three days in the appearance of lens masses in the anterior chamber.

Another feature difficult to explain is the complete closure of the tear in the capsule after the loss of cortex. After a minute tear in the anterior capsule the wound lips curl outwards and never reunite end to end. If no lens matter appears in the wound—which may happen under certain conditions—a fibrinous exudate is formed on the anterior surface of the lens and the defect in the epithelium is replaced by the neighbouring epithelial cells which slide over it. Later the fibrinous membrane is absorbed and the epithelial cells produce homogeneous lamellae which form a new capsule. It is, however, difficult to visualise this mechanism with cortex gushing out of the tear in the capsule.

Perhaps the presence of the anterior capsular cataract offers an explanation. This abnormality is due to a proliferation of the cubical cells which line the anterior capsule, and these cells might have succeeded in closing the wound where a normal epithelium would have failed to do so.

The last, and greatest difficulty is the surprising fact that after the absorption of part of the lens the refraction was finally normal. At the height of the condition the "mushroom" had about half the size of a normal lens. The lens had suffered a substantial loss of cortex—but the eye remained emmetropic. (No myopia can have existed before the injury as the vision was normal on the day of its occurence). Only two guesses can be put forward: Either a genuine regeneration of the lens had taken place, or the proliferation of the capsular epithelium during the healing process had given the capsule an additional refractive power.

This latter contention might be supported by the fact that members of certain coloured races—*e.g.*, West Africans and Sudanese—have a definite tendency to an abnormal fibroplastic reaction. Surgeons have noticed that these patients react very frequently with keloids, and it has been observed that corneo-scleral trephining in glaucoma is frequently ineffective in members of these races as the trephine opening has a strong tendency to become obliterated by fibrous tissue. The presence of a congenital anterior capsular cataract might be an additional factor producing a proliferation of capsular epithelium.

The attempted explanation of this case seems to override accepted principles. I should be very pleased to hear of a more orthodox solution of this problem.

I wish to thank Lt. Col. J. Amos, R.A.M.C. for his permission to publish this case and Lt. Col. G. I. Scott, R.A.M.C. for his advice.

ANNOTATION

Medical Books. The inadequacy of their supply in relation to Present and Future Requirements

The Publishers' Association, at the request of Medical Publishers, in a memorandum dated October, 1944, calls attention to the present acute shortage of medical books and is a cogent argument in favour of the government making more paper and labour in the printing and binding trades available for books at the earliest possible moment. It is urged that a distinction should be drawn between medical books such as those on medicine, surgery, obstetrics, public health, nursing, pharmacy, anatomy, physiology, pathology and bacteriology, first-aid and veterinary medicine and surgery and books on medical matters issued for the general public. "Scientific literature and popular works cannot be satisfactorily considered together." Any reduction in scientific output must inevitably hamper medical education and the spread of medical knowledge, and accordingly react unfavourably on the community as a whole.

In the last five years it has been impossible to maintain the basic requirements for education. The numbers of registered doctors in Great Britain has increased enormously during these years. The numbers of medical students has also increased very largely. All medical schools are full and the Goodenough Committee envisages an increased intake. Figures for nurses are not available, but here again the increase in numbers is known to be considerable. The same applies to pupil midwives and students of first-aid.

Next, the requirements of the overseas market are at least twice as great as in pre-war years.

The memorandum points out that many of the medical text-books are of very large size; the life of editions is short, in view of the need for keeping up-to-date.

Such economies as reduction of paper weight, narrower margins and increase in the number of words to the page have been used by the publishers but these cannot produce any substantial saving. Printers are now working with depleted staffs and have to meet heavy demands from H.M. Stationery Office. Medical books as a rule are liberally illustrated and the number of experienced block makers has been reduced. Binders are in the same boat.

"It follows that the release of key men to the printing, engraving and binding trades as soon as possible would have a profound influence on medical book production."

This is only the barest abstract of the facts set forth by the memorandum. "Medicine cannot stand still without injury to the whole community; equally, it cannot advance without books."

In our own branch of medicine one has only to note the slowing

down in the publication of the Transactions of our society, the volume for 1943 being just published as we write this; and to realize that the *British Journal of Ophthalmology* has been utterly unable to produce any monograph supplements during the past five years, to realize the gravity of the situation and to make us hope for speedy improvement.

ABSTRACTS

MISCELLANEOUS

(1) **Bland, J. O. W. (Memorial Ophthalmic Laboratory, Egypt).—Spontaneous folliculosis in Grivet and Vervet monkeys and the susceptibility of the Grivet to trachoma virus.** *Jl. Path. and Bact.*, Vol. LVI, p. 161, No. 2, April, 1944.

(1) The virus inclusion bodies of trachoma can be found in every case of early trachoma if sufficient trouble is taken in looking for them. On the other hand they have been found very rarely in experimental animals, and then mainly in the higher apes. Only once have they been found in any species of monkey.

The grivet monkey is susceptible to trachoma and responds to infection by the production of follicles in the fornices of the conjunctiva but not on the tarsal conjunctiva as in man; also there is no invasion of the cornea by blood vessels nor any subsequent conjunctival cicatrization, as in man. Thus the four characteristic signs of trachoma in man are lacking in the grivet.

This follicular conjunctivitis of the grivet induced by trachomatous inoculation can be passed, and after four passages the virus remains virulent for man in whom it can produce typical trachoma. This was effected by **Bland** in the case of two Europeans who exhibited no evidence of past or present trachoma. Virus inclusion bodies present in the original inoculum taken from children with typical trachoma, were not found in any of the author's experimental animals. They reappeared concurrently with the appearance of clinical trachoma in the men infected from a grivet of the fourth passage.

It is important to note that the reaction of grivets and vervets to trachoma cannot be distinguished clinically or histologically (except in site of origin) from the spontaneous folliculosis from which these monkeys frequently suffer. In the author's opinion this renders grivets and vervets unsuitable for trachoma research.

He remarks that the trachoma inclusion body so closely resembles that of psittacosis that one could not feel sure of distinguishing between them in films stained by ordinary methods. It is impossible to believe that the nature of those two so similar structures is

essentially different. It is known that in psittacosis the inclusion is a colony of the virus and the same thing is almost certainly true of the trachoma inclusion. In psittacosis the formation of inclusions is the normal method of multiplication of the virus, but what happens to the corresponding trachoma virus in the grivet, and in what form does it multiply? Why does it not form colonies in this animal?

As trachoma progresses, and as the clinical picture takes on its diagnostic character the inclusions become fewer and may even vanish. It seems unlikely that the full development of the disease is solely a tissue reaction to early damage caused by an agent which itself soon dies out. Almost certainly the virus persists, but not in a morphologically recognizable form.

A. F. MACCALLAN.

(2) **Igersheimer, Joseph (Boston).—Intra-ocular pressure and its relation to retinal extravasation.** *Arch. of Ophthal.*, Vol. XXXII, No. 1, p. 50, July, 1944.

(2) **Igersheimer** had a patient with enormous elevation of non-protein nitrogen in the blood and with high blood pressure, in whom ophthalmoscopic examination failed to reveal any haemorrhages or spots in the retina. Glaucomatous cupping could be seen to be developing and the question was, had this anything to do with the absence of retinopathy? Grafe, in 1924, described a case of diabetic retinopathy in one eye which gradually diminished with the onset of glaucoma, the fellow eye being already glaucomatous and showing no retinal changes. Schiech in 1930 mentioned that renal retinopathy disappeared with the onset of glaucoma, while the author had a somewhat similar case in whom two years previously, long-standing arterio-sclerotic retinopathy had been present; when he examined her, the left eye had normal tension and marked retinopathy, the right had a hazy cornea and only indirect ophthalmoscopy was possible. This showed cupping of the disc, but no retinal spots. When the cornea had cleared, numerous small yellow spots were visible in the retina, but none of the usual bright white ones. Another case of unilateral glaucoma in hyperpiesis showed absence of haemorrhages in the affected eye. Salzmann had two cases in which glaucoma preceded the development of thrombosis of the central retinal vein but neither ophthalmoscopic nor histological examination showed any retinal haemorrhages. As a converse to these observations, there is the papilloedema which sometimes develops in eyes with very low tension and the well known observations of Parker on dogs and monkeys in which one eye was trephined and the intracranial pressure artificially raised, with resulting papilloedema, developing first in the eye with lower tension. These observations indicate that pressure outside the vessel wall is a factor

which may influence transudation through it, low pressure favouring and high pressure hindering the process.

F. A. W-N.

(3) **Castroviejo, Ramon (New York).—Keratectomies for treatment of corneal opacities.** *Arch. of Ophthal.*, Vol. XXXII, No. 1, p. 11, July, 1944.

(3) Keratectomy is an operation which may well prove useful in cases of corneal opacity which are unfavourable for grafting. Among these, **Castroviejo** mentions the following:—corneal scars of excessive density or with pronounced superficial vascularisation, corneae affected with dystrophia adiposa or other forms of dystrophy, recurrent pterygium, pseudo-pterygium and symblepharon. The author gives details of technique in operating for six different conditions, accompanied by numerous photographs. The simplest operation, that for dealing with a transverse band opacity, is carried out as follows, under local or general anaesthesia. The area to be excised is outlined by horizontal incisions above and below the opacity, made with a Graefe knife and extending through the anterior third of the thickness of the cornea. A drop of fluorescein is instilled to make the incision more visible. Dissection of the superficial layers is begun on the temporal side with a Graefe knife, the edge of the corneal flap being held in fine conjunctival or in jeweller's forceps. The dissection is carried on until the nasal margin of the cornea is reached and the flap then cut off with scissors, an "antiseptic" ointment, preferably containing penicillin, is inserted and a monocular dressing applied, which is renewed daily, atropine being used if there be ciliary injection. Epithelialisation is complete in four to seven days, when the eye may be uncovered. In cases where larger areas of cornea have to be removed, the dissection is started with a Graefe knife and the separation is continued with blunt pointed scissors. Should there be much vascularisation of the scar, irradiation, starting not later than twenty-four hours after operation, is indicated, using either X-rays or the beta emmanation of radium.

F. A. W-N.

(4) **Stocker, F. W. and Prindle, R. E. (Durham, North Carolina).—A new type of pigment line in the cornea.** *Amer. Jl. Ophthal.*, Vol. XXVII, p. 341, 1944.

(4) **Stocker** and **Prindle** report the case of a corneal pigment line in the eye of a negro which had been severely inflamed. The cause of the inflammation was probably tuberculosis. Histologically the pigment was in the corneal epithelial cells. Bowman's membrane was intact and free from pigment, The pigment did not take the iron stain and was considered to be melanin.

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(5) **Agatson, S. A. (New York).—Congenital cyst of the optic nerve.** *Amer. Jl. Ophthal.*, Vol. XXVII, p. 278, 1944.

(5) **Agatson** reports the case of a 19 year-old girl with a congenital cyst extending from the upper third of the disc to below the disc. The elevation was 6D., it was 1·5 of the disc's diameter and moderately translucent. The main branches of the central retinal vessels were visible through the cyst wall. The cyst arose from remnants of Cloquet's canal.

H. B. STALLARD.

BOOK NOTICES

Transactions of the Ophthalmological Society of the United Kingdom. Vol. LXIII. J. & A. CHURCHILL. 1944.

Everything, they say, comes to him who waits. Never before in our long history have the members of the Ophthalmological Society had to wait so long for the appearance of their annual volume of Transactions. The reason is due to war conditions and members will doubtless put up with it as they have with much else. It is one of those very slim books which are characteristic of the period, but though small in bulk it is full of meat. In fact we are reminded of the well known advertisement of Bovril in this connexion. The reports of those valuable discussions appear as well as those of the affiliated societies. We welcome the reappearance of the Oxford Congress. That the Society has been able to carry on its work during these difficult times is to all of us a matter of very great satisfaction. When peace comes we hope it will be possible to obviate such marked delays in publication.

May and Worth's Manual of Diseases of the Eye. Revised by MONTAGUE L. HINE, M.D., F.R.C.S. Pp. viii and 538. 371 Illustrations, 32 colour plates. Ninth edition. London: Bailliére, Tindall and Co. 1944. Price, 16s.

Clearly printed on good paper this standard work has been brought up to date by the inclusion of a description of sulphonamide therapy, and the use of penicillin, and an extended note on the use of vitamins. Improvements on the 1939 edition have been made by a revision of the chapter on optic atrophy and a more extensive description of glass injuries which should prove very helpful, especially in Southern England at the present time.

Apart from a few unimportant faults such as the recording of visual acuity in feet in the caption of one illustration and in meters in the accompanying text and one or two poorly printed coloured plates, the book is excellent and its reputation will be enhanced.

There is much more in it than is required by the average student and it will form a most excellent book of reference for the general practitioner.

NOTES

Ophthalmological Society of the United Kingdom. Annual Congress 1945

THE Annual Congress will be held in London on April 13 and 14. Subjects for discussion have been arranged on "The ocular sequelae of head injuries" and on "Plastic Repair of the Lids." A joint clinical meeting with the Section of ophthalmology of the Royal Society of Medicine will be held on April 13. Members who wish to show cases should communicate with Mr. Victor Purvis, at the Royal Society of Medicine. Those who intend to read papers or take part in the discussions should notify Mr. Frank Law before February.

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Australia. Forum of National Affairs

SIR JAMES BARRETT is the President and a driving force in a recently established concern in Australia which aims at mutual instruction of the population in a Forum of National affairs. Open debates and discussions are held weekly. The notice sent us is accompanied by a three page pamphlet on "What is the cause of the war. Could it have been prevented?" Sir James considers that the "only remedy is to teach our young people the German system of trade education, and develop efficiency and thoroughness, and then to do what they (the Germans and Japanese) are not doing—think for themselves."

His summary suggests that we want (1) an adequate library system; (2) a department of information available to all; (3) the development of open debates by properly informed people; (4) a university publicity officer for the benefit of all.

Sir James is assisted by a strong committee and British Ophthalmology will wish to congratulate him on his public spirit as shown in this and very many other undertakings.

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Special Notice

WE are asked by the Ministry of Information to state that the fact that goods made of raw materials in short supply owing to war conditions are advertised in this journal should not be taken as an indication that they are necessarily available for export.